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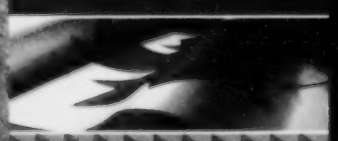
Nutrition and Food Security in Kugaaruk, Nunavut

Baseline Survey for the Food Mail Pilot Project

Food Mail



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Nutrition and Food Security in Kugaaruk, Nunavut

Baseline Survey for the Food Mail Pilot Project

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Dialogos Educational Consultants Inc.

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Executive Summary

Kugaaruk, formerly Pelly Bay, is a predominantly Inuit community of 600 people, located approximately 1300 kilometres northeast of Yellowknife, which serves as the "food entry point" for food shipped to this community under the Food Mail Program. The only grocery store in the community is a co-op.

The Kugaaruk Food Mail Pilot Project was initiated by Indian and Northern Affairs Canada with the co-operation of Health Canada, the Government of Nunavut, Canada Post and the Kugaaruk hamlet council. Its aim was to promote healthy eating and improve food security by reducing the postage rate for "Priority Perishables" (fresh and frozen fruit and vegetables, frozen juice concentrate, most fresh dairy products and eggs) from $0.80 per kilogram to $0.30 per kilogram, plus $0.75 per parcel, on December 1, 2001. The project also includes nutrition education, retail training in proper food handling and storage, and store labels to identify "Priority Perishables".

To obtain baseline data required to measure the impact of the pilot project, trained local interviewers administered a household questionnaire to all households and a nutrition questionnaire to women aged 15 to 44 in October-November 2001. The household questionnaire, completed by 92 Inuit households, asked about food purchasing practices, opinions about the quality, variety and cost of certain foods, reasons for not buying more fresh fruit and vegetables, demographic information and household food security, using a modified version of the United States Department of Agriculture Food Security Module. The nutrition questionnaire, completed by 87 Inuit women, included a 24-hour diet recall, a food frequency questionnaire, and questions on food preparation, health and lifestyle. A second 24-hour recall was completed by 53 Inuit women. Both questionnaires had an excellent participation rate (94% of available households and 92% of available eligible women).

Nutrient intakes were analysed using nutrient values from the 2001 Canadian Nutrient File, with additional information on country foods from published papers by Kuhnlein et al. The C-SIDE software was used to calculate the percentage of non-pregnant, non-lactating women with a usual intake below the Estimated Average Requirement for various nutrients. Mean energy and nutrient contributions by food group and Food Mail category were also calculated.

Food security was a serious problem in Kugaaruk, with five out of six Inuit households classed as "food insecure" and over half of families experiencing hunger in the past 12 months because they were unable to afford enough food, even though access to country food did not appear to be a problem or a serious concern and country food continues to be shared. Food costs were double those of Yellowknife and higher than in most other isolated communities. The lack of jobs in the community, low income levels, and the fact that over a third of households were receiving social assistance would also place this population at risk of food insecurity.

Almost half of Inuit respondents in the household survey said they were "extremely concerned" about being able to afford enough food for their family. Most respondents rated the quality of most perishable foods as only fair or poor, and cited cost, quality, availability and lack of variety as the major barriers to purchasing more fresh fruit and vegetables.

There were a number of serious nutrition and health issues. Twenty-five percent of Inuit women rated their health as fair or poor, a level almost four times higher than among women of a similar age in the Canadian population. Ninety-three per cent of Inuit women, including all pregnant women in the survey, smoked. Obesity was also prevalent, with one third of Inuit women having a Body Mass Index over 30, placing them at high risk of heart disease, diabetes and high blood pressure. Waist circumference, waist/hip ratios and activity levels also suggest a high risk for these diseases.

According to the Food Frequency Questionnaire and the 24-hour diet recall, country food consumption was lower than in previous surveys of Inuit women, providing only 10% of energy intake, mainly from Arctic char and caribou. No organ meats and very little country fat, seal, walrus or muktuk were reported. Based on the 24-hour recall data, 54% of Inuit women who were not pregnant or lactating had an inadequate intake of vitamin C, 68% for folate, 57% for vitamin B6 and 91% for magnesium. Mean intakes of vitamin A, calcium and fibre were also very low, and the mean saturated fat intake was higher than recommended. Foods of Little Nutritional Value were an important source of energy (19%), saturated fat and sugar, despite the fact that potato chips were not available at the store during the survey.

Priority Perishables were not an important part of the diet in this community. Inuit women were eating only about one serving of fruit and vegetables and less than one fifth of a serving of dairy products per day. Neither fresh nor UHT milk was generally available in the community. It appears, therefore, that the Food Mail Pilot Project is appropriately focussed and should help to increase the consumption of more nutritious store foods, thereby improving the nutrition of women of child-bearing age as well as the food security situation of Kugaaruk families.

Background

Nutrition and Food Security in Isolated Communities

A number of studies among Inuit women of child-bearing age have documented low intakes of folate, calcium, vitamin A and fibre, together with a high consumption of foods of little nutritional value [1 2 3]. Magnesium intake was also found inadequate among Inuit adults [3]. Studies in Pond Inlet and Repulse Bay in 1992 and 1997 found a higher percentage of women reporting poor or fair health compared to the general Canadian population, and an increase in the number of women with a Body Mass Index (BMI) over 27 [2]. Kuhnlein also found a higher prevalence of overweight among Inuit women compared to the Canadian population [3].

The Indian and Northern Affairs Canada (INAC) nutrition surveys also found that food security was a serious concern in each of the communities surveyed [2 4]. In 1997, approximately 80% of women in Pond Inlet and Repulse Bay reported running out of money to buy food, about half reported not having enough to eat in the house in the past month, and about 40% of women were "extremely concerned" about not having enough money to buy food. This situation was worse for families on social assistance, where women were significantly more likely not to have enough to eat in the house in the previous month compared to relatively well-off families [2]. In the 1997 Labrador Inuit Health Survey, 28% of households reported that they occasionally did not have enough to eat and 7% often did not have enough to eat [5].

Food insecurity has been identified by the Institute of Medicine as a predisposing factor to poor health and nutrition and as a nutrition risk factor for women in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) [6]. Food insecurity among school-age children has also been associated with compromised psychosocial functioning [7]. Food insecurity or insufficiency has been linked to a decrease in the consumption of fruits and vegetables, a lower amount of food in the household and a significant increase in scores indicative of disordered eating patterns with increasing food insecurity [8]. Compared to food-secure individuals in the United States, a higher percentage of food-insecure individuals failed to follow the dietary guidelines for vitamin C and a minimum number of servings of fruits and vegetables per day [8]. Other studies have found that on a given day, women from food-insufficient households were 1.4 times more likely to have energy intakes below 50% of those recommended. Low intakes were also more likely for vitamins A, E, C and B6 and mean calcium intakes were only 56% of the recommended allowance [9]. In Canada,

Tarasuk found that low-income women who reported hunger in their household in the past 30 days also had a lower mean intake of energy, vitamin A, folate, iron and magnesium. She concluded that this low level of intake could place these women at risk of nutrient deficiencies [10]. In Pond Inlet, folate intake was significantly lower among women on social assistance than among women who were relatively well-off [2].

The high cost of food in isolated Aboriginal communities and the inadequacy of social assistance payments to provide enough income to purchase a healthy diet have been reported in a number of food price surveys. In the 1992/93 nutrition surveys, INAC found that the Northern Food Basket cost 2 to 2½ times more in these communities than in Ottawa [11]. While the cost of perishables in some communities in Nunavut has decreased since 1991, following changes to the Food Mail Program, the overall cost of food has not declined substantially [12]. Other food price surveys in isolated communities in Yukon and Alberta have reported the cost of the Northern Food Basket at 80 to 200% higher than in the south [13 14]. Even though most families in these communities also rely on traditional food, obtaining this food is not without a cost. For some families, traditional food is not accessible due to a lack of equipment, skills or time, poor health or availability [2 5].

Poor quality and a lack of variety of Nutritious Perishable foods were also identified as concerns by Inuit and Fist Nations women in previous INAC surveys [2 4] and as barriers to the purchase of more fresh fruit and vegetables in the Labrador survey on food quality conducted by INAC [15].

Since 1991, INAC has introduced a number of changes to the Food Mail Program. These included the application of a uniform postage rate of $0.80 per kilogram plus $0.75 per parcel for Nutritious Perishable foods, effective July 1993, and changes to the eligibility criteria, so that all isolated communities became eligible for this subsidy, effective in October 1991. Non-perishable food and other essential goods continued to be shipped at higher rates, and Foods of Little Nutritional Value were excluded. In August 1996, certain prepared Convenience Perishable foods, such as frozen fried breaded chicken, became ineligible for the subsidy. These changes were expected to result in a lower cost for Nutritious Perishable foods, improvements in nutrient intake, especially for essential nutrients such as calcium, folate and vitamin A, and a lower consumption of Foods of Little Nutritional Value.

Changes to the Food Mail Program have resulted in a significant increase in shipments of Nutritious Perishable foods, but nutrition surveys among Inuit women of child-bearing age conducted in 1992, 1993 and 1997 failed to demonstrate any significant

improvement in nutrient intake in Pond Inlet or Repulse Bay over this period [2].

Food Mail Pilot Projects

In order to reduce the cost of nutritious food and promote healthy eating, Health Canada provided funding enabling INAC to carry out a series of Food Mail Program pilot projects in isolated northern communities. This investment was part of the Food Safety and Nutrition Program initiatives announced in the 1999 federal budget.

The Government of Nunavut and the community of Kugaaruk agreed to participate in the first pilot project. Kugaaruk was selected because it was located in the only region of Nunavut that had a regional nutritionist at the time and it was an appropriate size for a pilot project and a baseline survey to be carried out successfully with the funds available. It was also especially challenging in terms of the pilot project objectives. Food prices were unusually high in this community and the quality and supply of Priority Perishable food was known to be less than desirable. Therefore, if the pilot project could be successful in Kugaaruk, it would be reasonable to expect success in other communities.

Effective December 1, 2001, the postage rate for shipping the most nutritious perishable foods (designated as Priority Perishables) to Kugaaruk was reduced from $0.80 to $0.30 per kilogram plus $0.75 per parcel. Priority Perishables include fresh and frozen fruit and vegetables (excluding French fries and similar potato products), frozen fruit juice concentrate, most fresh dairy products and eggs. A country food component to the program has allowed the shipment of country food from Cambridge Bay at the Priority Perishable rate effective January 1, 2003. The project also includes measures to improve retail food quality, nutrition education on the use and benefits of these foods and retail promotion of healthy foods. This joint initiative is supported by INAC, Health Canada, the Department of Health and Social Services, Government of Nunavut, and Canada Post.

Food Supply System and Community Profile of Kugaaruk

Kugaaruk, formerly Pelly Bay, is a community of about 600 people, with 120 households and 135 census families, located approximately 1300 kilometres northeast of Yellowknife. The Koomiut Co-op, the only grocery store in the community, obtains its perishable food from suppliers in Edmonton. Orders are placed through Arctic Co-operatives Ltd. in Winnipeg. Some food suppliers in Yellowknife also ship food directly to individuals in Kugaaruk, using the Food Mail Program or air cargo service. Perishable food that is not eligible for shipment under the Food Mail Program would have to be shipped as regular air cargo or by charter at much higher rates.

Kugaaruk is the most remote community in the Kitikmeot Region in terms of the supply of both perishable and non-perishable food. Perishable food is trucked from Edmonton wholesalers to Yellowknife, the "food entry point" for food shipped to this community under the Food Mail Program by First Air. Fresh and frozen food is normally received once a week. For a few weeks during the spring breakup on the Mackenzie River, however, food must be flown from Edmonton or Hay River to Yellowknife or shuttled across the river by helicopter, a service provided by RTL Robertson Enterprises Ltd. Neither trucking nor air service is provided from Edmonton under the Food Mail Program. Non-perishable food is resupplied once a year in September on the sealift from Montréal via Nanisivik, with the Coast Guard providing the final leg of this service from Nanisivik to Kugaaruk.

Kugaaruk's population increased by almost 50% (200 people) between 1991 and 2001. In the 2001 Census, approximately 95% of the population identified themselves as Inuit, and 47% of the population was under 15 years of age. While almost 60% of the population aged 15 and over were employed at the time of the 2001 Census, only 85 out of 320 adults (27%) had worked full-time throughout the previous year, compared to 35% of adults in Canada as a whole who had done so. Education levels were generally low. For example, about half of women aged 20 to 44 had not completed high school. Because of the low levels of full-time employment and education, the median census family income for the year 2000 was approximately $37,000, compared to about $39,400 in Nunavut and $55,000 in Canada [16].

Food Costs and Affordability in Kugaaruk

At the time of the baseline nutrition and food security surveys conducted in October-November 2001, food costs in Kugaaruk were very high. Prices of certain foods were as follows:

Regular hamburger, per kg	$9.20	Eggs, large, dozen	$3.79
Wieners, 450 g	$4.99	Evaporated milk, 385 mL	$2.99
Fried chicken pieces, 709 g	$13.99	Bread, 567 g	$2.39
Chicken thighs, per kg	$8.77	Milk, 1 L	$2.49*
Frozen French fries, 1 kg	$3.99 to $5.99	Cheese, mild cheddar, 227 g	$5.39
Frozen vegetables, 1 kg	$5.99 to $7.99	Flour, 5 kg	$19.99
Apples, per kg	$5.19 to $5.99	Lard, 454 g	$3.89
Bananas, per kg	$3.95	Pop, 355 mL can	$2.10 + GST
Potatoes, per kg	$4.99	Frozen pizza, 715 g	$10.49
Carrots, 907 g	$5.59	Frozen orange juice concentrate, 355 mL	$2.79 to $2.89

* Neither fresh nor UHT milk was available at the store during the survey period. Although the price posted was $2.49 per litre, the price of milk available in April 2001 and August 2001 was $4.99 for 1 L of UHT milk.

The perishables in a 46-item Northern Food Basket that would feed a family of four for a week cost $140 in Kugaaruk, compared to $67 in Yellowknife and $65 in Edmonton. Priority Perishables cost $87, compared to $37 in Yellowknife. The total cost of this basket was $327 in Kugaaruk and $163 in Yellowknife. Prices in Kugaaruk at that time were higher than in most communities using the Food Mail Program [12].

To provide an objective measure of food affordability in Kugaaruk at the time of the baseline survey, the after-shelter income of a two-parent family of four, with two children aged 8 and 14, living entirely on income support (social assistance) can be compared with the cost of the Northern Food Basket for a family of this size and type. In October 2001, this family would have been eligible to receive the following amounts: basic income support of $1,076 for food and clothing, the Basic Federal Child Tax Benefit of $186.17, the National Child Benefit Supplement of $192.50, the Nunavut Child Benefit of $55, and the GST Credit of $52.67 per month (paid quarterly), for a total of $1,562.34 [17, 18]. The monthly food cost for this family would be $1,416, or 91 percent of their after-shelter income. After purchasing this food basket and paying rent, they would have $146 left for other purposes.

The average number of social assistance cases in Kugaaruk in 2001 was 55 per month [19]. Single persons aged 18 and over would be treated as a separate "case", even if they lived with parents or other family members.

Survey Objectives

1. To evaluate the food purchasing patterns and food security status of households in Kugaaruk prior to the implementation of the pilot project on December 1, 2001.

2. To assess nutrient intakes and the general health status of Inuit women of child-bearing age in Kugaaruk at that time.

Survey Design and Methodology

Sample Selection

Participants were identified through a community list provided by the hamlet. All households were included in the household survey. All women aged 15 to 44, including pregnant and lactating women and non-Inuit women, with the exceptions noted below, were included in the nutrition survey. This population group was selected for the nutrition survey because it is at high risk for nutritional problems, and the health of women of child-bearing age has an important impact on the health of their children and, therefore, of the community.

For the Nutrition Questionnaire the following exclusions applied:

- interviewers;

- women within one week of childbirth, most of whom would be outside the community during this time;

- women non-resident in the community (away at school, for example); and
- women who were ill during the entire time of the survey, such that their food consumption was affected. For short duration acute illnesses, interviewers attempted to reschedule the interview upon recovery.

All participants were assigned an identification number to identify the household and individual. An information form in English and Inuktitut was provided to all participants and all eligible participants were asked to sign a bilingual consent form for each questionnaire. At the completion of the survey, participants were eligible for a $10 food voucher for each completed questionnaire. The nutritionist, coordinator and a hamlet council member participated in a radio interview to explain the purpose of the Food Mail Pilot Project and of this survey, the date when the new Food Mail rate for Priority Perishables would be introduced, which foods would be included in this special rate and how the results would be handled. We also explained that interviewers had sworn an oath of confidentiality and described the measures we were taking to protect the confidentiality of their responses.

Questionnaires were reviewed with the interviewers for cultural relevance and sensitivity and minor modifications made, as necessary.

Assessment Tools

Household Questionnaire

The Household Questionnaire was administered to the individual responsible for most of the food purchases. It included questions on the following:

- whether they had purchased selected foods, including certain Priority Perishable foods, Foods of Little Nutritional Value and country food over the previous four weeks;
- where certain foods were usually purchased (Co-op, from Yellowknife by Food Mail, by air cargo or other);
- perception of the quality of certain Priority Perishable foods;

- perception of the variety and price of fresh fruits and vegetables;
- reasons for not buying fresh fruit and vegetables;
- the 18-item US Food Security Survey Module with minor modifications to improve acceptability among the Inuit population. Following cognitive testing with the local Inuit interviewers, the food security questionnaire developed for the Alberta Northern River Basin Food Consumption Survey was modified to preface the food security statements with the phrase, "Some families might say." This approach was considered to be less direct and more culturally acceptable to the Inuit. Modifications adopted for the Alberta Northern River Basin Food Consumption Survey and used in the Kugaaruk survey included: (a) instead of asking if the statements were "always true", "sometimes true" or "never true", the respondent was asked if this happened "often", "sometimes" or "never" and (b) changing "balanced meals" to "healthy meals". The former modification avoided possible questioning of the respondent's truthfulness in the answers given. The latter modification acknowledged that "healthy" was more meaningful to the Aboriginal population than "balanced".
- reasons for being unable to afford enough food;
- action taken when there was not enough money to buy food;
- access to country food and school food programs;
- degree of concern over specific social issues (running out of money to buy food, alcohol and drug abuse, the safety of country food, family violence, lack of jobs, and access to country food). This question helped to provide a context within which the perception of the severity of concern over food security could be considered vis-à-vis other social issues.
- socio-demographic factors relating to household size, ethnic status, sources of income, income of households not receiving social assistance, and expenditure on food and other necessities.

Nutrition Questionnaire

The Nutrition Questionnaire included:

- a 24-hour diet recall administered to 93 women;
- a modified food frequency questionnaire covering a total of 81 foods, including country food, Priority Perishable food, Convenience Perishables, selected Non-perishable foods and Foods of Little Nutritional Value. A number of steps were

taken to reduce respondent burden on the Food Frequency Questionnaire. Individual food consumption frequency was only asked about fruits and vegetables commonly consumed in Inuit villages. To handle less commonly eaten fruits and vegetables, participants were asked to select the five most frequently eaten from a series of photographs. The use of photographs also avoided any misunderstanding which might arise from translation.

- questions on perceived health status, lifestyle (i.e., smoking, pregnancy and lactation status, activity level), medical conditions affecting diet, and anthropometric measurements (height, weight, waist and hip circumference). For participants who did not know their height and weight, weight, height, waist and hip measurements were recorded at the health centre using a balance scale. Questions relating to perceived health status and smoking were included in order to provide a context within which food security and nutrient intake could be considered. Information on smoking status permitted a more accurate evaluation of the requirement for vitamin C, which is higher for smokers. The cost of cigarettes must also be considered a factor in food insecurity. Perceived health status is a well-recognized indicator of population health and, therefore, is relevant to the issue of food insecurity and nutrient intake.

- a second 24-hour recall administered to 56 women to permit a statistical correction for within-person variation in nutrient intakes.

Interviewer Training and Data Collection

Interviewers were selected by the local survey coordinator and provided with five days of training by the project nutritionist in survey objectives and methodology, protecting confidentiality and minimizing refusals. Special attention was given to the proper use of food models and the standardized procedure for conducting a 24-hour diet recall. Other topics included reading labels and details of some of the foods sold in the local store.

Data collection took place over a three-week period in October-November, 2001. Bilingual response cards were used for the questions on income, activity level and food security statements. Photographs of fruit and vegetables were used to enable respondents to quickly identify foods purchased or consumed, and package labels were used to clearly distinguish between fruit drink crystals with and without vitamin C, and between fruit juice and fruit drinks. Nutrition Canada graduated food models were used to describe portion size.

Data Analysis

Household data were entered into Excel and then into the R Statistical System for analysis. Means and frequencies were calculated for each question. Families were divided into three socio-economic groups (Social Assistance, Working Poor and Relatively Well-Off), based on household income and size. The division into Working Poor and Relatively Well-Off groups was based on the Statistics Canada Rural Low Income Cutoff (LICO) numbers applied to reported income [20].

Food security status was analysed according to socio-economic group using the Fischer Exact Test, which gives exact statistical results for small sample sizes. Twenty-four-hour recall data were entered into the nutrition evaluation program of Micro Gesta Inc. Nutrient data for most foods were based on the Canadian Nutrient File 2001 (CNF) modified to reflect the most recent folic acid values. To arrive at the Dietary Folate Equivalents (DFE) for each food, food folate was calculated by subtracting folic acid values from folacin. This value was then added to folic acid multiplied by 1.7 to produce DFEs for each food. Nutrient data for country foods not included in the CNF were based on the published data of Kuhnlein and the Alaska Health Service [21] [22] [23]. Recipes were adapted from the USDA recipe file using CNF data and published country food values. Foods were categorized into 13 food groups and six Food Mail categories.

Nutrient data were then exported into a text file for analysis. In order to determine the percentage of a population whose usual intake of a nutrient is below the Estimated Average Requirement (EAR), it is necessary to estimate the distribution of usual intakes among individuals [24]. The usual intake for a group cannot be determined from 24-hour recall data without calculations that disentangle between-individual and within-individual variation. Because daily intakes of nutrients are generally not normally distributed, a complex set of adjustments and transformations is required.

In the current study, the required adjustments and transformations were performed using the C-SIDE software, which is based on the work of Nusser [25]. Specifically, the C-SIDE software was used to:

1. apply a power transformation to make the distribution of the 24-hour recall data more symmetric;

2. make adjustments to the data to account for variations between initial and subsequent 24-hour recalls and the day of the week the interview was conducted;

3. apply a semiparametric transformation to further normalize the data; and

4. estimate the distribution of usual intakes.

This program generates an adjusted mean and median for energy and nutrients. In cases where an EAR is known, and where the distribution of requirements among individuals was known to be symmetric, the percent of women below the EAR for women 19 to 30 was determined using the EAR cut-point method [24]. This percentage is considered to have a usual inadequate intake.

Since the distribution of requirements for iron is non-symmetrical, the EAR cut-point method is not appropriate for determining the probability of inadequacy. Therefore, the probability approach was used [24]. In this calculation, distribution percentiles generated by the C-SIDE program for iron were used in conjunction with probabilities of inadequate iron intakes to estimate the percentage of the population with an inadequate intake. These probabilities and ranges were based on data on usual intakes for a mixed population of women using and not using oral contraceptives derived from the Continuing Survey of Food Intakes by Individuals, 1994-96 [26].

To calculate the simple mean energy and nutrient intake and mean intake by food group and Food Mail category, the first and repeat recalls were averaged for each respondent who completed two recalls and combined with the data from women who completed only one. Mean energy and nutrient intakes were then calculated for the population, by food group and Food Mail category. Frequencies were determined with Epi Info 2000.

Linear statistical modelling analysis (i.e. T-tests, Fischer Exact test) was used to examine relationships between socio-economic group and food security versus intake of key nutrients, consumption of Priority Perishables (based on the mean intake of vitamin A and folate from these foods), energy intake versus BMI and age, and country food consumption versus age group (15 to 24 and 25 to 44). Due to the small sample size, no adjustments were made for confounding variables. For most analyses, plots were examined graphically in order to identify unusually high or low values.

Preliminary results were discussed with community members to verify our findings and ensure that the questionnaire on food security was well understood, particularly the more severe aspects of food insecurity such as cutting down on the size of meals or going hungry because they were unable to afford enough food to feed their family. The

findings were discussed in separate meetings with members of the hamlet council, nursing staff, the Food Mail Pilot Project Co-ordinator and the interviewers. We also participated in an open-line radio show where the results were presented and community members were asked for their comments and questions.

Methodological Considerations

Food Security Questionnaire

The 1992, 1993 and 1997 INAC nutrition surveys indicated that food security was perceived as a problem by Inuit women of child-bearing age [24]. However, the questions did not assess the severity of the problem.

To date, no instrument has been validated to measure food insecurity among Aboriginal populations that depend in whole, or in part, on hunting or fishing for food. However, the most widely validated tool available to measure food insecurity is the US Food Security Survey Module Questionnaire [27]. This instrument has been validated in a number of annual national surveys in the United States, including the Current Population Survey. This 18-item questionnaire evaluates the severity and prevalence of food insecurity and enables a classification of households by food security status. The score depends on the number of valid affirmative responses to each question. The questions are arranged (with a few exceptions to improve readability) in increasing degree of food insecurity, reflecting ranges of severity, from a score of 0, or "Food Secure", to a maximum score of 10, indicating "Food Insecure with Hunger". The questionnaire builds on the work of Radimer and colleagues at Cornell University who developed a food sufficiency questionnaire to measure food insecurity among low-income women [28], and has now been used in a number of national American surveys, in the Northern River Basin Food Consumption Survey, as well as in third-world countries. This measurement methodology has also been used to compare the effects of ethnic/cultural differences on the measurement of food insecurity and hunger [29].

According to Mark Nord of the USDA Economic Research Service, the modifications made to the questionnaire to improve cultural acceptability for an Inuit population did not affect the scaling.

It is important to remember that this questionnaire reflects "household" food security status, and not necessarily the status of any individual within the household. It is also based on experiences over the previous 12 months, and may not relate to the income over the previous month or to the nutrient intake of women over the previous 24 hours.

Assessing Usual Intake

The 24-hour recall is the most widely used instrument to evaluate energy and nutrient intake. Estimating the usual intake of a group is complicated by large variations in intake from day to day, between individuals and by season [30], the degree of variation differing among nutrients [31 32 33 34]. Individuals also vary in their requirements for energy and nutrients. For example, iron requirements vary widely among women of child-bearing age due to differences in menstrual flow. For most nutrients, an average of three or more 24-hour recalls on non-consecutive days is considered sufficient to produce a reasonably accurate estimate of intake for an individual. In order to produce reasonable results for a group, at least some individuals (a minimum of 40) need to be interviewed at least twice in order to perform the necessary calculations to estimate the distribution of usual intakes [25].

The Canadian Recommended Nutrient Intakes (RNIs) and American Recommended Dietary Allowances (RDAs) were set with a safety factor above typical requirements, so that if a group had a mean intake equal to the RNI or RDA, you could be reasonably confident that their usual intake exceeded the individual requirements of most individuals in the group.

The new Dietary Reference Intakes (DRIs) represent a more complex set of values developed for different planning or assessment purposes. With these new values, the RDA is defined as "the average dietary intake level that is sufficient to meet the nutrient requirement of nearly all healthy individuals in a life stage and gender group" [24].

Comparison of the mean intake of a group with the new RDAs and the conclusion that diets are adequate if they meet or exceed the RDA are inappropriate because the prevalence of inadequacy depends on the shape and variation of the "usual" intake distribution, not on mean intake. If group mean intake equals the RDA there will be a substantial proportion of the group with usual intake less than their requirement [24].

An estimate of inadequate intakes for a group is now based on the percentage below the EAR (i.e. the median daily nutrient intake level estimated to meet the requirement of half the healthy individuals in a particular life stage and gender group within the general North American population) [24]. The percentage below the EAR may be calculated using a program such as C-SIDE software, which performs the necessary adjustments to estimate the distribution of usual intakes [25].

The establishment of the EAR takes into account the reduction in the risk of chronic degenerative diseases in addition to the prevention of nutrient deficiencies. The EAR can be used to examine the probability that an individual's intake is inadequate. As mentioned above, it can also be used to estimate the prevalence of inadequate intakes within a group. Since the EAR, by definition, only meets the requirements of half of the individuals in a group, it cannot be used as an intake goal for individuals. The RDA, which is calculated from the EAR by taking this value and adding 2 standard deviations, thus exceeding the requirements of 97.5% of the individuals in the group, is the appropriate goal for individuals. The EAR is used to plan for an acceptable prevalence of inadequate intakes within a group.

The 24-hour recall data were collected from women aged 15 to 44. Ideally, the results would be analysed according to three separate age groups (14 to 18, 19 to 30 and 31 to 50) for which EARs have been estimated. However, the small sample size made this impossible. Instead, we selected the EARs for women aged 19 to 30, based on a median age of 27. This methodology may result in an under- or overestimate of energy and nutrient requirements, depending on the age of individuals and the respective requirement.

The validity of the 24-hour recall depends on the respondent's memory and ability to recall portion sizes. Furthermore, the validity is affected by certain respondent biases. Respondent errors may include under- or over-reporting and the influence of social desirability. Under-reporting of energy intake appears to affect as many as 25% of dietary records [35]. In a number of studies, BMI has been found to be a predictor of under-reporting [36 37 38 39 40], with women tending to under-report more than men [40 41]. Social desirability also affects under-reporting, especially of macronutrient intake [37 38 39 42]. Under-reporting of energy intake by social desirability trait was found to be higher among women with less than college education than among those with college education [42].

Both the co-operation of the respondent and her ability to accurately recall food consumption are influenced by the interviewer's skill with the instrument. The

interviewer must be able to prompt memory, without suggesting an appropriate response. The instruments used to describe portion size play an important role, since the portion size of some foods may be more difficult to estimate than others. Household measures such as cups, spoons, etc., do not allow for slight differences in amounts and they are difficult to use for foods of irregular shape or cooked mixtures which are mounded on a plate. Standardized graduated food models improve the accuracy of recalling portion size by providing a range of choices. For certain nutrients, accurate recall of portion size is critical. For example, since fat is a concentrated source of energy, a small underestimate in portion size would result in a significant underestimate of energy intake.

Conducting 24-hour recalls in a single season ignores important seasonal differences in the consumption of country food and some store foods as well. Nutrient intake may also vary seasonally, especially for nutrients such as vitamin A, vitamin D, cholesterol and linoleic acid, all of which are concentrated in a few foods. Comparison of the results of this survey with previous INAC surveys of other Inuit communities may also be difficult, since most of them were conducted in the spring.

Finally, the results of a 24-hour recall may suggest areas of concern for the community or specific groups and educational needs, but individual assessment of nutritional status and health would require clinical and biochemical investigation.

Food Frequency Questionnaire

The food frequency questionnaire (FFQ) is generally used in large epidemiological studies as a means of ranking individuals in terms of risk of chronic disease according to their consumption of certain foods, and may provide information on the variety of food consumed over a longer period than a 24-hour recall. However, it has a number of inherent problems, including the respondent's ability to report consumption over the selected time period. Since respondents may have difficulty estimating frequency and portion size over a long period, they tend to overestimate consumption and report their routine or typical diet rather than the specifics of what they ate over the period in question [43]. Comparison of the Block FFQ and the Harvard FFQ with 24-hour recalls found that both instruments overestimated intakes of protein, calcium, vitamin A and vitamin C. The Harvard questionnaire also overestimated energy intake, whereas the Block questionnaire overestimated iron intake [44]. While the food frequency questionnaire tends to overestimate food consumption, it does provide information on

how frequently foods are consumed over a specific period. For these reasons, the food frequency questionnaire used in the current study asked only about the frequency of consumption, not the usual quantities consumed.

The validity of the food frequency questionnaire could be improved by basing it on a 24-hour recall, if this information were available, and by modifying the format to be more culturally sensitive in terms of the order of foods. Alternatively, the food frequency could be reviewed by local representatives to select the most important foods and the most appropriate order. In this case, the questionnaire was reviewed by local representatives to ensure that the most important foods were included.

Neither the 24-hour recall nor the food frequency questionnaire, by themselves, have the capacity to determine what proportion of a group has an inadequate or excessive energy intake, since both instruments may be affected by under- or over-reporting, and do not take activity level into account. Instead, the BMI, in addition to detailed information on activity level, is used for this purpose.

Inuit and Non-Inuit Respondents

Although there are very few non-Inuit residents in Kugaaruk, they were asked to participate. This was done to respect the wishes of the Government of Nunavut, which represents all Nunavummiut, rather than the Inuit alone. However, since there were only six non-Inuit women who completed the nutrition survey, we did not report the results of their 24-hour recall data. We also felt that it was more important to provide accurate data for the Inuit alone than combined data for the entire community.

For the Household Questionnaire, we decided to include the non-Inuit responses to the questions related to food purchasing, since we believed it was important to document the differences between Inuit and non-Inuit food purchasing patterns. We combined Inuit and non-Inuit responses to the questions about perceptions of variety, quality and cost. However, we did not combine their responses to the food security questionnaire in order to focus on the food security situation of the Inuit. All non-Inuit households were food secure.

Household Survey Results

Household Size and Composition

Household composition is presented in Table 1. Of the 98 households, 92 were Inuit (at least one adult was Inuit). There were 282 Inuit adults, 85% of whom were between 18 and 44 years of age. Among Inuit households, there was a total of 250 children, and an average of 2.7 children per household. Forty percent of Inuit children were aged 5 or under, and 39% were between 6 and 12 years of age.

Table 1. Household composition, Kugaaruk, 2001

	All	Inuit
Total number of households	114	106
Number of households where food purchaser was unavailable or out of town	10	8
Total number of households surveyed	98	92
Refusal rate (%)	6	6
Age of adults by ethnic status	**Number**	**%**
Between 18 and 44		
Inuit	241	81
Non-Inuit	9	3
Between 45 and 59		
Inuit	24	8
Non-Inuit	5	2
Between 60 and 64		
Inuit	12	4
Non-Inuit	0	0
Aged 65+		
Inuit	5	2
Non-Inuit	0	0
Total	296	100
Distribution of Inuit children by age group (n=250)		%
Children 5 or under	101	40
Children 6 to 12	98	39
Children 13 to 17	51	20
Average number of children per household		2.7

Source and Amount of Income and Expenditure on Food

Sixty-nine percent of households reported earning money from a job or business. Approximately one third had received social assistance and 10% Employment Insurance in the past month. About one third also reported having received hunter support at some point (Figure 1). Forty-five percent of households not receiving social assistance reported an income of $1500 or less for the past month (Table 2). Approximately half of households reported that their income in the previous month was the same as their usual income. The average weekly food expenditure for Inuit households was $402.

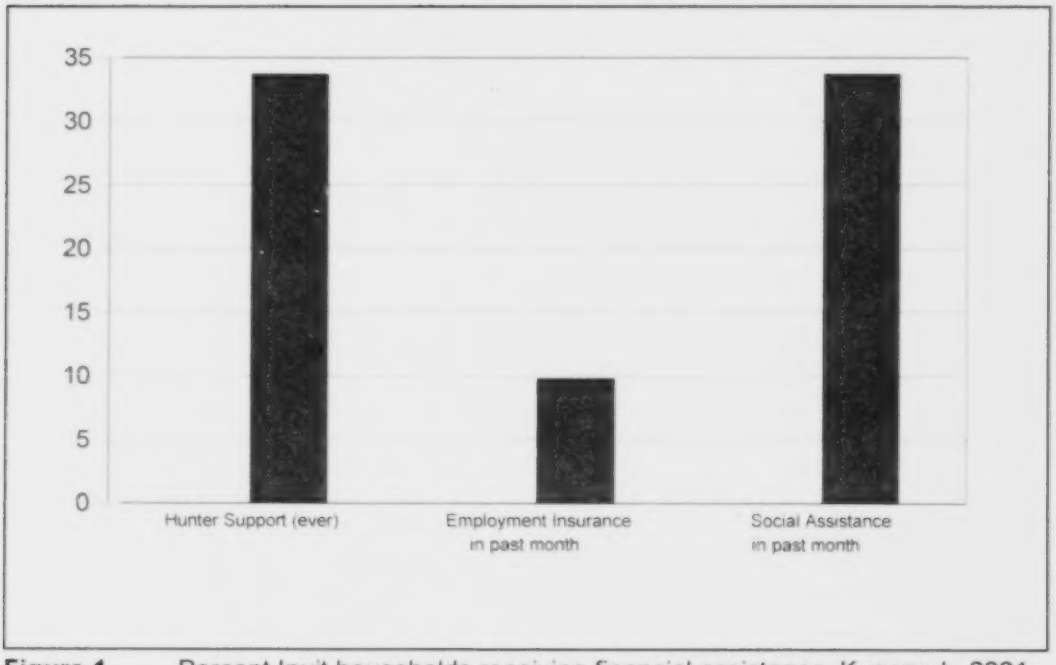

Figure 1 Percent Inuit households receiving financial assistance, Kugaaruk, 2001

Table 2. Inuit household income and expenditures, Kugaaruk, 2001

Percent households earning money from different sources (n=85)	%
Selling fur or sealskins	13
Selling crafts	21
Job or business	69
A pension	21
Percent households receiving financial assistance (n=92)	**%**
Hunter Support (at any time)	34
Employment Insurance (in past month)	10
Social assistance (in past month)	34
Total household income [1] of households not receiving social assistance in the past 4 weeks (n=61)	**%**
$1500 or less	46
$1501 to $2000	26
$2001 to $3000	16
$3001 or more	7
Don't know	5
Reported income compared to usual income (n=42)	**%**
Same	55
More than usual	17
Less than usual	12
Don't know	17
Average weekly food expenditure	$402

[1] Income includes take-home pay from a job, money from selling furs, sealskins, carvings or crafts, pensions, net income from running a business and Employment Insurance.

Food Security

The extent and severity of household food insecurity was measured with the US Food Security Survey Module. The 18-item food security questionnaire asks about conditions, experiences and behaviours characteristic of a wide range of severity of food insecurity and hunger experienced over the past 12 months (See Appendix B). The first two questions reflect uncertainty about having enough food and the experience of running out of food. The remaining items are arranged in increasing order of severity, screening out food-secure participants early in the process.

In the general American population, food insecurity follows a progressive scale of severity, such that adults will report doing without before obvious behavioural signs of food insecurity are reported for children. However, in this survey, children were affected by household food insecurity at nearly the same level of severity as were adults. This pattern was also typical (although not as marked) of surveys conducted among other North American Aboriginal groups [45 29]. For this reason, the results for the 10-item adult/household scale and the 8-item child scale are presented separately (Table 3).

"Food insecure" or "food insecure without hunger" includes affirmative responses to questions describing anxiety about having adequate money or food to feed the family and perceptions that the food eaten by adults or children was inadequate in quality or quantity. Cutting down on the size of the meal, eating less than you felt you should, not eating for a whole day and being hungry because there wasn't enough money for food are questions describing the most severe condition, "food insecurity with hunger".

On the 10-question adult scale, three or more affirmative responses are required for a household to be classified as "food insecure without hunger". In Kugaaruk, most food insecure households reported a larger number of these conditions. Six or more affirmative responses to adult-referenced questions are required for a household to be classified as "food insecure with hunger".

Children's food security status is calculated from the eight questions that ask specifically about food conditions among children in the household. The first three child items reflect disrupted eating patterns or reduced quality and variety and identify children who are "food insecure" or "have a restricted diet" in this analysis. "Food insecure with hunger" refers to the more severe items on the child scale, namely skipping meals because there wasn't enough money for food, doing so at in least three months in the past year, and going hungry and not eating for a whole day. Two or more affirmative responses to child-referenced questions are required for a household to be classified as having food insecurity among children and five or more affirmative responses to be classified as food insecure with hunger.

Adults were experiencing food insecurity without hunger in 24% of Inuit households. Adults in 54 households (59%) were "food insecure with hunger" (Table 3). On the children's food security measure, children were food secure in only 17% of Inuit households, 30% were food insecure without hunger and in 52% of households, children were hungry at times because the household could not afford enough food (Table 3, Figure 2).

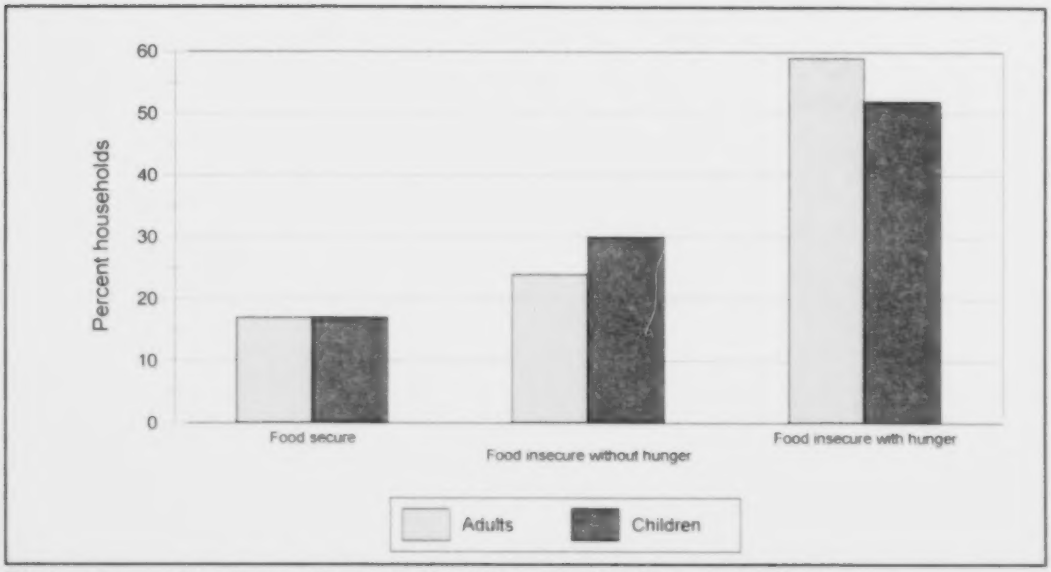

Figure 2 Food security status, Inuit households, Kugaaruk, 2001

Looking at both measures for households with children, both adults and children were food secure in only 14% of Inuit households. In two thirds of households, adults, children, or both were food insecure with hunger, and in 43% both adults and children were food insecure with hunger (Table 3). In 2001, 3.3% of households in the United States were food insecure with hunger [46]. Compared to the general U.S. population this community is "a very food-needy population".

Table 4 presents responses to individual questions by food security status. Between 83 and 92% of all households had experienced anxiety about being able to afford enough food. Between 27 and 66% of all households experienced the more severe conditions, such as cutting the size of the meal, skipping meals, eating less than they should, going hungry and not eating for a whole day in three or more months because they were unable to afford enough food. It is alarming that 28% of all households reported that children did not eat for a whole day. These conditions were more prevalent among households classified as "food insecure with hunger". Fifty percent of these respondents reported they had lost weight because there wasn't enough money for food, and 44% did not eat for a whole day in three or more months because they were unable to afford enough food.

Table 3. Food security among Inuit Households, Kugaaruk, 2001

	Number	%
Adult food security (n=92)		
Food secure	16	17
Food insecure without hunger	22	24
Food insecure with hunger	54	59
Children's food security among households with children (n=86)		
Food secure or only one child-related food security problem	15	17
Food insecurity of children ("reduced quality or variety of children's diets" without hunger)	26	30
Severe food insecurity of children (children hungry at times because household couldn't afford enough food)	45	52
Food security among households with children (n=86)		
Food secure – both adults and children	12	14
Food insecurity without hunger among either adults or children or both	17	20
Food insecure without hunger – both adults and children	11	13
Food insecurity with hunger		
Hunger among either adults or children or both	57	66
Hunger among both adults and children	37	43
Hunger among adults but not children	12	14
Hunger among children but not adults	8	9

Note: Food security was measured using the US Food Security Survey Module, modified following cognitive testing among Inuit interviewers. For the purposes of this survey, only Inuit households are included in the analysis. The results were analysed by Mark Nord, Economic Research Service, USDA. For this survey, the 10-item adult/household scale was used to describe conditions among adults and the 8-item children/household scale to describe conditions among children.

The frequency of occurrence of these conditions or behaviours provides additional insight into the severity of food insecurity (Table 5). At least half of families reported they often worried about being able to afford enough food, often ran out of money to buy food and often relied on few kinds of low-cost foods to feed their children. The more severe conditions, such as adults cutting the size of their meals or skipping meals, affected one third of families almost every month and 18% of adults reported not eating for a whole day almost every month because they were unable to afford enough food. In 24% of families, children skipped meals almost every month because there was not enough money for food.

This level of food insecurity existed despite the fact that 96% of households had access to country food most of the time, in two thirds of households children under five received breakfast, lunch or snacks at day care, pre-school or kindergarten, and in 76% of households children 6 to 17 received breakfast, lunch or snacks at school (Table 6).

Table 4. Responses to food security scale items, Inuit households, Kugaaruk, 2001

Scale item	Households affirming item		
	All households (n=92)	All food insecure households without hunger (n=22)	All food insecure households with hunger (n=54)
		Percent [2]	
Household items			
Worried food would run out before we got money to buy more	92	95	100
Food bought didn't last, and we didn't have money to get more	88	95	100
Couldn't afford to eat healthy meals	83	91	98
Adult items			
Adults cut the size of meals or skipped meals because there wasn't enough money for food	60	18	94
Respondent ate less than felt he/she should [1]	66	50	93
Adults cut size of meal or skipped meals in 3 or more months [1]	53	9	87
Respondent hungry but didn't eat because couldn't afford	50	14	80
Respondent lost weight [1]	30	4	50
Adults did not eat for a whole day [1]	30	14	46
Adults did not eat for a whole day in 3 or more months	27	4	44
Child items (for households with children)	All households (n=86)	All food insecure households without hunger (n=26)	All food insecure households with hunger (n=49)
		Percent [2]	
Relied on few kinds of low-cost foods to feed children [1]	86	96	100
Couldn't feed children healthy meals [1]	80	92	100
Children were not eating enough [1]	74	73	100
Cut the size of children's meals [1]	56	27	89
Children were hungry [1]	56	15	98
Children skipped meals [1]	44	4	82
Children skipped meals in 3 or more months	41	4	78
Children did not eat for a whole day [1]	28	0	53

[1] The actual wording of the item includes a specific reference to not being able to afford enough food.

[2] Percentages are based on the number of valid responses to each item. Households without children are excluded from the child-referenced items.

Table 5. Percent reporting frequency of occurrence of behaviours, experiences, and conditions affecting food insecurity, Inuit households, Kugaaruk, 2001

Condition	Frequency of occurrence: Often	Sometimes	Total (ever during the year)
		Percent [2]	
Worried food would run out before we got money to buy more	53	39	92
Food bought didn't last and we didn't have money to get more	50	38	88
Couldn't afford to eat healthy meals	35	48	83
Relied on few kinds of low-cost food to feed children [1]	51	35	86
Couldn't feed children healthy meals [1]	42	38	80
Children were not eating enough [1]	35	39	74

	Frequency of occurrence: Almost every month	Some months but not every month	In only 1 or 2 months	Total (ever during the year)
		Percent [2]		
Adults cut size of meals or skipped meals [1]	35	18	5	60
Adults did not eat for a whole day [1]	18	9	3	30
Children skipped meals [1]	24	17	3	44

[1] The actual wording of the item includes a specific reference to not being able to afford enough food.

[2] Percentages are based on the number of valid responses to each item. Households without children are excluded from the child-referenced items. Total includes frequency not stated.

The high cost of food and having to pay bills were the major reasons given for being unable to afford enough food. When faced with this situation, most Inuit households (82%) borrowed food or money from friends or family (Table 6). The high cost of gas and repairs were the principal reasons why families were unable to get country food (Table 7).

Table 6. Reported reasons for food insecurity and remedial action taken, Inuit households, Kugaaruk, 2001

Reasons for not being able to afford enough food (n=78)	%
Food costs too much	78
Had to pay bills (like hydro, children's clothing, school supplies)	71
Gave money away	36
Not enough income	35
Had to buy hunting, fishing or trapping equipment, supplies or gas	27
Not working	13
Spent money gambling	9
Waiting for EI or Social Assistance	5
Gave food away to others in the community	4
Don't know or refuse	1

Action taken by Inuit households when they were unable to afford enough food (n=72)	%
Borrow food or money from friends or family	82
Go hunting or fishing	44
Make an item to sell	39
Do without	21
Ask store manager for more credit	6
Other	11

Percent households where children under 5 received breakfast, lunch or snacks at a day care, pre-school program or kindergarten (n=74)	64
Percent households where children 6 to 17 received breakfast, lunch or snacks at school (n=79)	76

Table 7. Country food access among Inuit households, Kugaaruk, 2001

Percent households with access to country food most of the time (n=90)	96

Reasons why households are unable to get country food (n=65)

	Number	%
No transportation	6	9
No hunter or fisherman in household	2	3
Hunter or fisher in family is sick/injured	4	6
Hunter or fisher is working	10	15
Gas too expensive	60	92
Repairs too expensive	57	88
Country food not available	1	2
Food not shared in community	0	0
No place to store country food	4	6
No hunting or fishing equipment	4	6
Other	5	8
Total	153	

Note: Households could provide up to 3 reasons.

Food Security and Socio-economic Group

Table 8 shows the breakdown of Inuit families on the basis of socio-economic group.

Table 8. Distribution of respondents by socio-economic group, Inuit households, Kugaaruk, 2001

	%	n
Received social assistance in past month	35	31
Working poor [1]	49	45
Relatively well-off	12	11
Income unknown	5	5
Total	100	92

[1] Working poor families: not on social assistance and family sizes 1, 2, or 3 with monthly income <$1500; family size 4 or 5 with monthly income <$2000; and family size 6+ with monthly income <$3000.

The LICOs are used by Statistics Canada to identify Canadians in "straightened economic circumstances"[20]. Strictly speaking, these LICOs are not applicable to Inuit living in the North. They do not take into account the very high price of commercial food and other goods in the North, nor do they consider the very high cost of housing if purchased at market rates. On the other hand, the LICOs do not consider the fact that many individuals in the North have their housing costs subsidized, nor the fact that most families have access to country food. The rural LICOs are used here as a convenient way of producing two income groups of reasonable size. Raising the income level used to determine the "relatively well-off" would reduce the already small size of this group.

As illustrated in Figure 3, over half of adults in Inuit families on social assistance or in working poor families were classed as "food insecure with hunger," with the bulk of the remaining families being "food insecure without hunger." While adults in families that were relatively well-off were somewhat more likely to be food secure (p=.015 for the Fisher Exact Test of "social assistance" and "working poor" combined vs "relatively well-off"), even here, less than half the adults were food secure. It is important to keep in mind that the US Food Security Survey Module measures the extent and severity of food insecurity during any time over the past 12 months, whereas the reported income was based on the previous month.

Figure 4 shows that the results were similar for children. Again the relatively well-off were more food secure (p=.014), but all groups had major food insecurity problems.

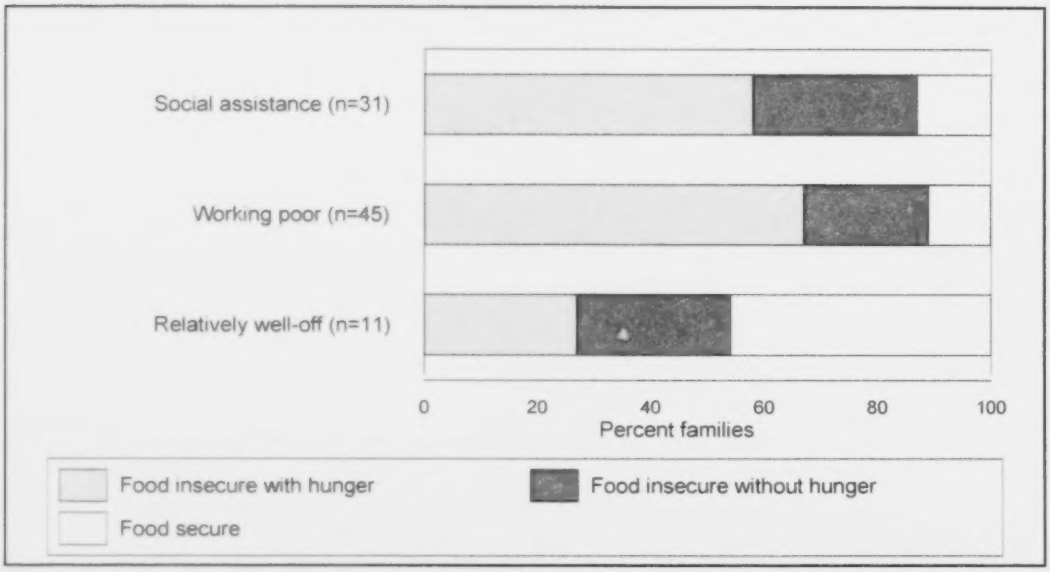

Figure 3 Adult food security by socio-economic group, Inuit households, Kugaaruk, 2001

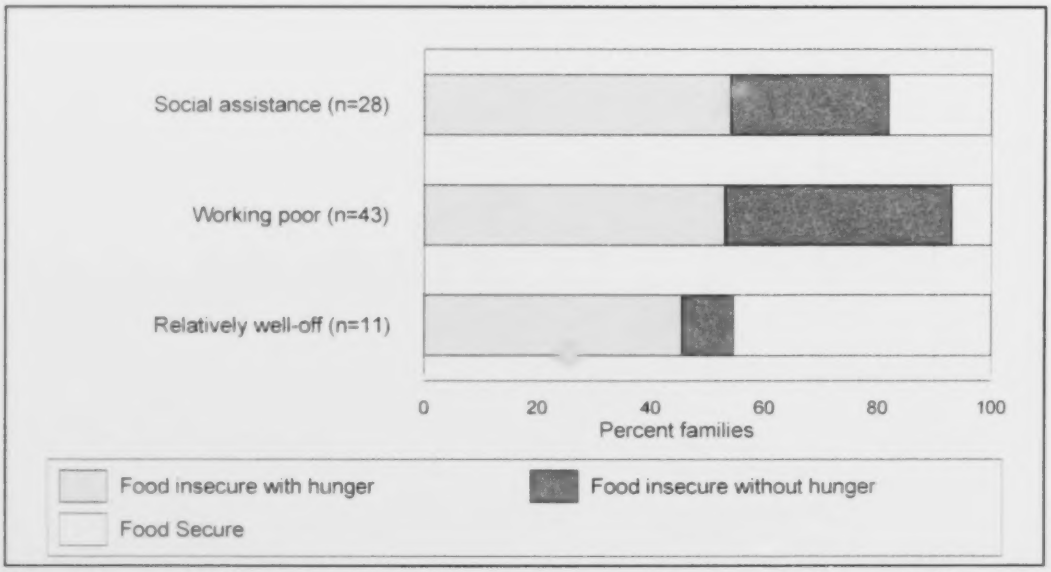

Figure 4 Children's food security by socio-economic group, Inuit households, Kugaaruk, 2001

Social Issues of Concern

When asked about the degree of concern over six social issues, the two issues of greatest concern were the lack of jobs (80% "extremely concerned") and not having enough money for food (45% "extremely concerned"). About one quarter of Inuit households were extremely concerned about alcohol and drug abuse and family violence (Figure 5). For all of these issues, the percentage who were "extremely concerned" was slightly higher in Kugaaruk in 2001 than in Pond Inlet or Repulse Bay in 1997 [2]. The relative importance of not having enough money for food vis-à-vis other issues adds further credence to the results on the food security questionnaire.

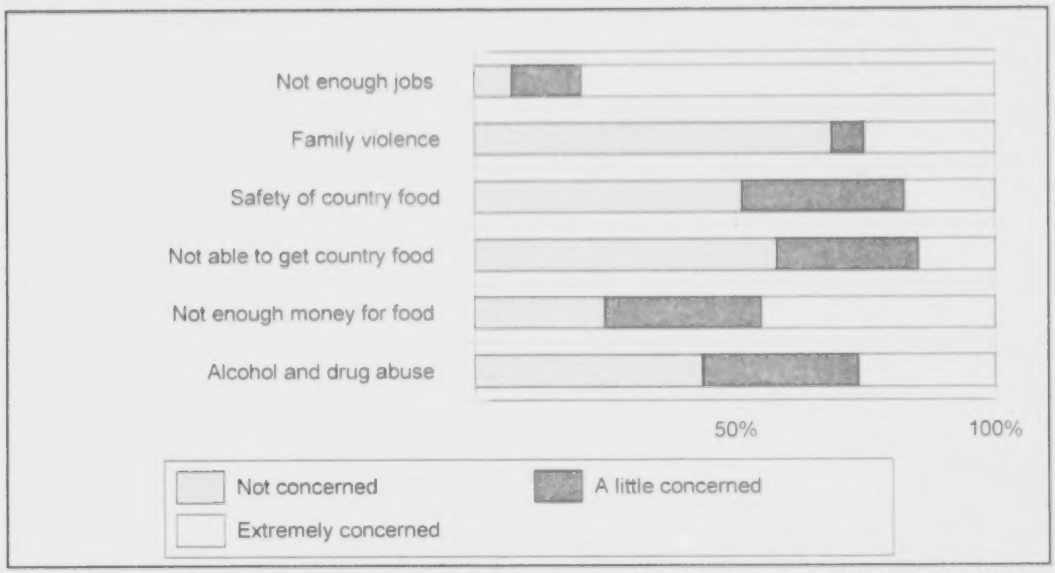

Figure 5 Degree of concern over social issues, Inuit households, Kugaaruk, 2001

Food Purchasing Practices

Source of food purchases

Almost all Inuit households purchased their food entirely from the Co-op, whereas most non-Inuit households purchased meat, frozen food and milk privately from Yellowknife by Food Mail. Fruit and vegetables were purchased from the Co-op and by Food Mail by non-Inuit households. One half of Inuit households and one third of non-Inuit reported purchasing country food from the Co-op.

Perceptions about quality, variety and cost

Poor quality of fresh fruits and vegetables and fresh milk is clearly a problem in Kugaaruk (Table 9, Figure 6). Sixty to 65% of households rated the quality of apples, oranges, bananas and grapes, and lettuce, tomatoes and peppers as poor or fair.

As Table 9 indicates, two thirds of households considered the variety only "sometimes" adequate, and another 10% considered variety was "never" adequate. Three quarters of households found the price of fresh fruit and vegetables higher than last year.

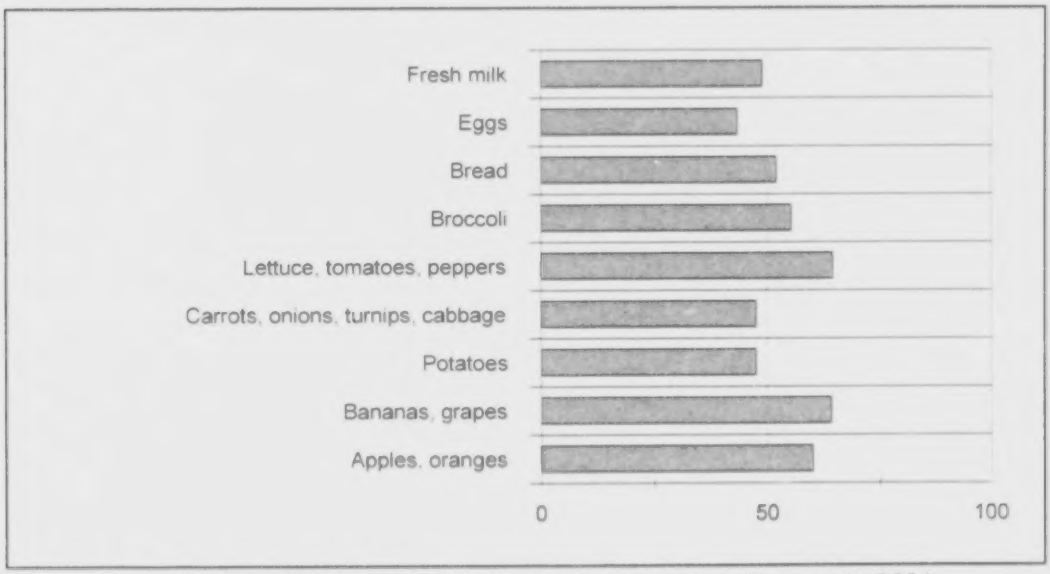

Figure 6 Percent of households rating foods poor or fair, Kugaaruk, 2001

Table 9. Perceptions of quality, variety and cost of perishable foods, all households, Kugaaruk, 2001

Quality of perishable foods sold in Kugaaruk	n	Poor	Fair	Good	Excellent	DK	NA
		%	%	%	%	%	%
Apples	98	18	42	34	4	2	0
Oranges	98	16	44	33	4	2	1
Bananas, grapes	98	29	36	31	3	1	1
Potatoes	95	9	39	42	4	7	0
Carrots, onions, turnips, cabbage	97	14	34	42	7	4	0
Lettuce, tomatoes, peppers	96	33	31	23	3	7	2
Broccoli	92	25	30	23	7	13	2
Bread	98	18	34	41	5	2	0
Eggs	97	12	31	49	5	2	0
Fresh milk	94	15	34	43	4	4	0
Frozen store meat	95	8	32	52	5	3	1
Frozen vegetables	96	5	22	59	10	4	0
Other frozen food	93	7	30	53	7	5	0

Enough variety of fresh fruit and vegetables in Kugaaruk (n=98)	%
Always	8
Most of the time	7
Sometimes	67
Never	10
Don't know	7
Total	100

Price of fresh fruit and vegetables compared to same time last year (n=98)	%
Higher	76
Lower	0
Same, no change	10
Don't know	14
Total	100

Frequency of food purchases in the past four weeks

The most frequently purchased fruits included apples, oranges and bananas purchased by 78 to 84% of households. Among fresh and frozen vegetables, the most popular were French fries (78%), onions (76%), frozen mixed vegetables (59%) and potatoes (56%). Almost all households purchased frozen pizza (93%). Ice cream, evaporated milk and cheese were the most frequently purchased dairy products. Very little country food was purchased from the Co-op during the previous four weeks.

Approximately one third of Inuit households purchased less than 6 kinds of fruit and vegetables, and 54% purchased between 6 and 10 fruit and vegetables in the past four weeks (Table 10). This pattern was very different from the non-Inuit, 50% of whom purchased more than 10 fruits and vegetables over the same period.

Table 10. Percent of households who purchased fresh fruits and vegetables in the past four weeks

	Inuit (n=92) %	*Non-Inuit (n=6)* %
Less than 3 fresh fruits and vegetables	5	17
Less than 6 fruits and vegetables	35	33
Six to 10 fruits and vegetables	54	17
More than 10 fruits and vegetables	11	50

For Inuit households, the most important barriers to buying fruits and vegetables were: cost (89%); poor quality and availability (64%); and not enough variety (53%) (Figure 7). Very few respondents cited a greater preference for canned or frozen products, a dislike of the taste, a belief that these foods were unnecessary to good health, or a lack of knowledge regarding the preparation of these foods.

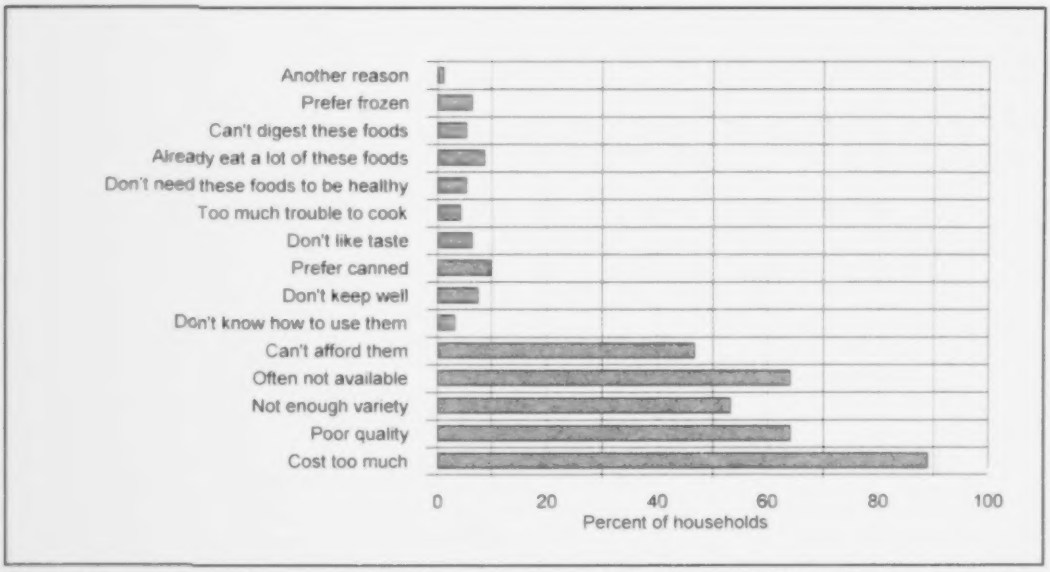

Figure 7 Reasons for not buying more fresh fruit and vegetables, Inuit households, Kugaaruk, 2001

Nutrition Survey Results

Respondent Profiles

Ninety-three women aged 15 to 44 participated in the nutrition survey, 87 of whom were Inuit with an average age of 26. Eight women (8% of available eligible women) refused to participate, and seven were unavailable. Ten Inuit women were pregnant and 18 breastfeeding at the time of the survey. The distribution of ages among non-pregnant, non-lactating women were as follows: 15 to 18, 21%; 19 to 30, 36%; and 31 to 44, 43%. The mean and median age for this group was 27 and 28, respectively. The mean and median age of lactating women was 26 years, and the age groups were as follows: 15 to 18, 6%; 19 to 30, 72%; and 31 to 44, 22%.

Food Frequency Questionnaire

According to the food frequency questionnaire, the most frequently consumed country foods in the previous month were, in descending order of importance, Arctic char, caribou, muktuk, whitefish and polar bear (Figure 8).

Among Inuit women, the most frequently consumed store foods, in descending order of importance, were pop, coffee, tea, Tang, white bread, chocolate bars, Kool-Aid, potato chips, oranges, eggs, frozen pizza and onions (Figure 9). Fresh or boxed milk and yogurt were reported only twice in the past month, processed cheese slices and cheese spread only four times, and block cheese, three times.

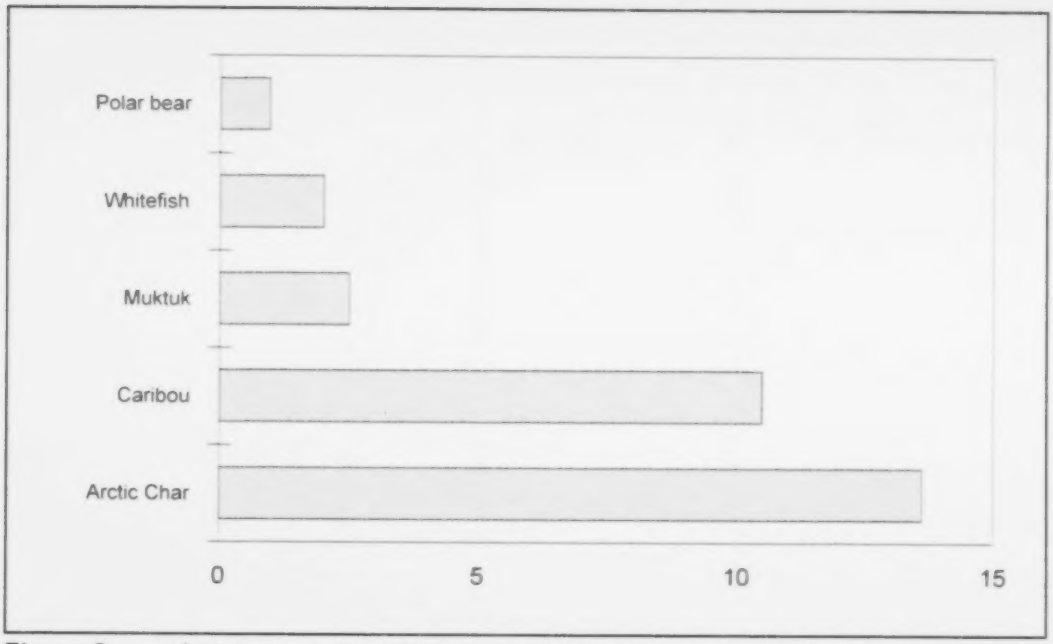

Figure 8 Average number of times country foods were reported eaten in the past month, Food Frequency Questionnaire, Inuit women, Kugaaruk, 2001

As Figure 10 illustrates, oranges, bananas and apples were the only fruit eaten more than five times in the past month. The most popular vegetables, in descending order of importance, were onions, fresh, frozen or canned corn, frozen French fries and frozen mixed vegetables. The most popular potatoes were French fries, instant mashed and fresh potatoes.

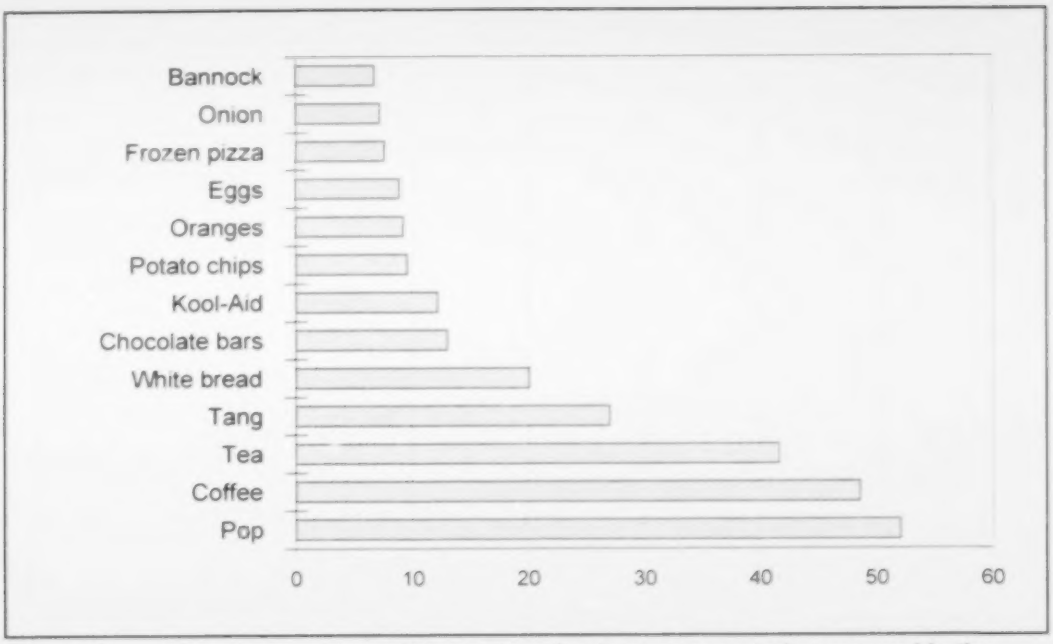

Figure 9 Average number of times store foods were reported consumed in the past month, Food Frequency Questionnaire, Inuit women, Kugaaruk, 2001.

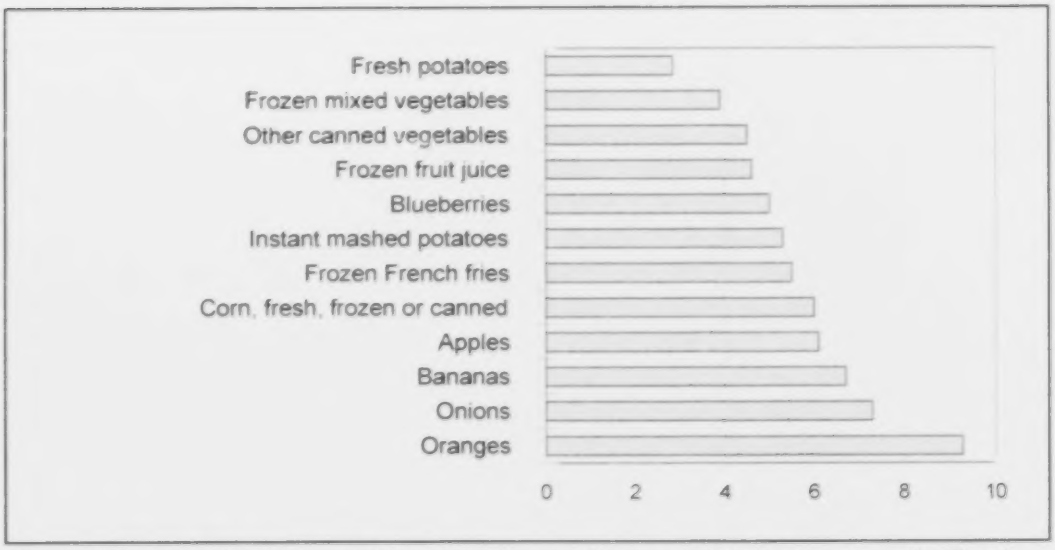

Figure 10 Fruit and vegetables most frequently reported in the past month, Food Frequency Questionnaire, Inuit women, Kugaaruk, 2001

Food Consumption Patterns (24-hour recall)

Country food

Among Inuit women, the average consumption of country food was 140 grams per day. Country Meat, Birds and Fish accounted for 60% of all Meat, Poultry and Fish. Very few country foods were reported during this period. Arctic char was the most important country food (98 grams), followed by caribou (34 grams), polar bear (4 grams), muktuk (2 grams), whitefish and dried caribou (1 gram each) (Figure 11). ("Other" includes walrus, seal, and caribou fat.) No liver or other organ meats were reported. The consumption of country food was similar to the amount reported in Repulse Bay and less than in Pond Inlet in the 1997 surveys [2].

Country food consumption tended to be higher among women 25 to 44 than among younger women. As shown below, there was a significant difference in consumption between these groups (p=.07 for Calories and p=.03 for amount). A similar, but somewhat stronger positive relationship between consumption of country food and age has been documented elsewhere [1,47].

Dependent Variable	Age Group	Mean intake	p value
Calories	15 to 24	131	.07
	25 to 44	237	
Amount (g)	15 to 24	81	.03
	25 to 44	169	

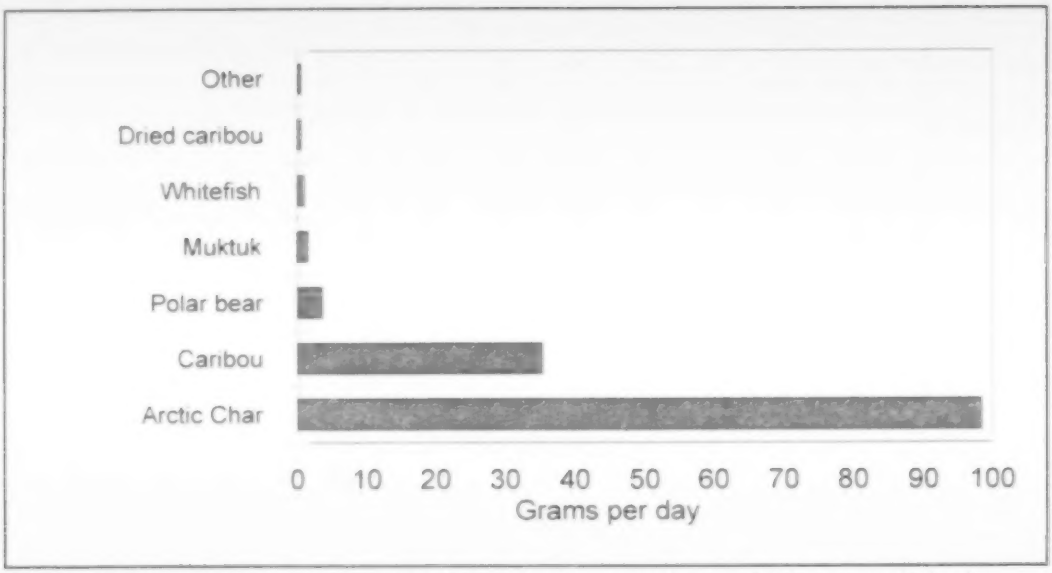

Figure 11 Average consumption (grams) of country foods, 24-hour recall, Inuit women, Kugaaruk, 2001

Store foods

Dairy Products

Only 30 grams of Dairy Products were consumed, representing less than one fifth of a serving (Table 11). Whole undiluted evaporated milk accounted for 60% by weight of this food group. Virtually no fluid milk was consumed. However, almost no fresh or UHT milk was available in the store throughout the survey period.

Table 11. Mean daily amounts of Dairy Products consumed by Inuit women: 24-hour recall, Kugaaruk, 2001

Food Mail Category	Food	Amount (grams)
Nutritious Perishable	Ice cream	7
	Cheese, processed spread, cheddar	1
Non-perishable	Milk, evaporated, whole, canned	18
Priority Perishable	Cheese, processed, cheddar	2
	Cheese, Parmesan, grated	1
	Milk, fluid, 2%	1
Total (all Dairy Products)		30

Note: Includes foods with an average consumption of 1 gram or more.

Store Meat, Poultry and Fish

According to the 24-hour recall, store Meat, Poultry and Fish was less important than country food (92 grams versus 140 grams) (Table 12). One third of store Meat, Poultry and Fish was frozen, breaded, fried chicken, while ground beef accounted for about one quarter, and spareribs, wieners and canned luncheon meat a similar amount in total.

Table 12. Mean daily amounts of store Meat, Poultry and Fish consumed by Inuit women: 24-hour recall, Kugaaruk, 2001

Food Mail Category	Food	Amount (grams)
Nutritious Perishable	Beef, ground	26
	Spareribs	11
	Wieners	7
	Chicken	4
Non-perishable	Luncheon meat, pork, canned	8
Convenience Perishable	Breaded fried chicken	31
Total (all store Meat, Poultry and Fish)		92

Note: Includes foods with an average consumption of more than 1 gram.

Cereal Products

This group includes all pasta except pasta and cheese dinners (e.g., Kraft Dinner), which are included with Miscellaneous foods. The most important cereal products were instant rice, white bread and flour (Table 13). No whole grain products were reported. Neither ready-to-eat nor cooked breakfast cereals were important foods.

Table 13. Mean daily amounts of Cereal Products consumed by Inuit women: 24-hour recall, Kugaaruk, 2001

Food Mail Category	Food	Amount (grams)
Nutritious Perishable	Bread and rolls, white	23
	Oatmeal, cooked	3
Non-perishable	Rice, all types, cooked	65
	Pasta, cooked	3
	Flour	14
	Pilot biscuits and crackers	9
	Pancake mix, prepared	3
	Ready-to-eat breakfast cereals	4
	Cake mixes, prepared	2
Total (all Cereal Products)		117

Note: Includes foods with an average consumption of more than 1 gram.

Fruits and Vegetables

Fruit and vegetable consumption was very low – only about one serving a day compared to the Canadian recommendation of five to ten servings . The most popular foods in this group were French fried potatoes, canned apple juice and frozen mixed vegetables (Table 14).

Fats and Oils

According to the 24-hour recall, Inuit women consumed an average of 9 grams of fats and oils. The most commonly consumed fats were butter (34%), lard (22%), margarine (21%), salad dressing (13%) and oil (7%).

Sugar and Sweets

The average consumption of Non-perishable Sugar and Sweets (excluding Foods of Little Nutritional Value) was 375 grams. This group includes fruit drink crystals with vitamin C, frozen lemonade and fruit punch, sugar and syrups. Fruit drink crystals were the most important food in this group, with an average daily consumption of 342 grams (including added water), followed by sugar at 19 grams.

Table 14. Mean daily amounts of Fruits and Vegetables consumed by Inuit women: 24-hour recall, Kugaaruk, 2001

Food Group	Food Mail Category	Food	Amount (grams)
Citrus and Tomatoes	Non-perishable	Apple juice, canned or bottled, vitamin C	15
		Tomato sauce, canned	3
	Priority Perishable	Oranges	9
Other Fruit	Non-Perishable	Grape juice, canned/bottled	6
		Peaches, canned	5
	Priority Perishable	Apples	3
		Blueberries, frozen	2
		Peaches, raw	1
Potatoes	Nutritious Perishable	Potato, French-fried and hash brown, frozen	56
	Non-perishable	Potatoes, instant mashed	2
	Priority Perishable	Potatoes, fresh	4
Other Vegetables	Non-perishable	Corn niblets, canned	1
	Priority Perishable	Mixed vegetables, frozen	12
		Onions	6
		Corn, frozen	2
		Lettuce, iceberg	1
Total (all Fruits and Vegetables)			132

Note: Includes foods with an average consumption of 1 gram or more

Miscellaneous Foods

This group includes Nutritious Perishable foods such as pizza, Non-perishable foods like tea, coffee, baking powder, macaroni and cheese dinner, canned beef stew, canned pasta dishes, canned soup and soup mix, and Convenience Perishables such as packaged sandwiches and burgers. Municipal water, including the water used in coffee, tea and soup, is also included in this group. An average of 1137 grams were reported, 92% of which was Non-perishable food (Table 15).

Foods of Little Nutritional Value

A total of 665 grams of Foods of Little Nutritional Value were consumed per day (Table 16). This included an average of approximately one and a half cans of pop and half a glass of reconstituted fruit drink crystals without vitamin C. Consumption of potato chips was much lower than in other communities. However, potato chips were unavailable locally at the time of the survey.

Table 15. Mean daily amounts of Miscellaneous Foods consumed by Inuit women: 24-hour recall, Kugaaruk, 2001

Food Mail Category	Food	Amount (grams)
Nutritious Perishable	Frozen pizza	51
	Frozen dinners	7
Non-Perishable	Coffee, brewed	437
	Tea, brewed	339
	Water, municipal	82
	Macaroni and cheese dinner, prepared	28
	Dry soup mix, added to recipes	4
	Soup mix, prepared	77
	Soup, canned, prepared	2
	Mixed dishes, beef stew, canned	7
	Canned spaghetti sauce with meat	4
	Mixed dishes, Hamburger Helper	3
	Canned pasta	12
Convenience Perishables	Packaged sandwiches and burgers	36
Total (all Miscellaneous foods)		1137

Note: Includes foods with an average consumption of more than 1 gram.

Table 16. Mean daily amounts of Foods of Little Nutritional Value consumed by Inuit women: 24-hour recall, Kugaaruk, 2001

Food	Amount (grams)
Cookies	1
Potato chips	3
Fruit drink crystals, no vitamin C, with water	124
Soft drinks	513
Candies	6
Coffee whitener (non-dairy), powdered	4
Chocolate bars	14
Total (all Foods of Little Nutritional Value)	665

Note: Includes all foods of 1 gram or more.

Food Preparation Methods

Three quarters of Inuit women reported butter as their usual spread for bannock or bread. Canned evaporated milk was the milk most commonly used on cereal and in mashed potatoes. In coffee and tea, the majority used coffee whitener rather than milk. About half of respondents used water rather than milk in bannock and macaroni and cheese dinner. Diluted evaporated milk was used in bannock by 40% of respondents and by 36% in macaroni and cheese dinner. Almost all respondents used lard to prepare bannock. The average proportion of flour to lard (by weight) used to prepare baked bannock was 8.4 to 1.

Health and Lifestyle of Women

Self-rated health status

Most women rated their health as good. Twenty-five percent of Inuit women rated their health fair or poor, similar to other INAC surveys among Inuit women in Pond Inlet and Repulse Bay (Figure 12) [2]. By comparison, only 6.9% of Canadian women aged 15 to 44 years of age rated their health at this level in 2000-2001 [48]. Six percent reported medical conditions that affected their diet.

Smoking

As in other nutrition surveys among Inuit women, smoking rates were extremely high (Table 17). Ninety-three percent of all women and 100% of pregnant women smoked (Figure 13). On average, women started smoking at 14 years of age. Most smoked every day, smoking an average of 9 cigarettes per day (all women) and 7 per day (pregnant women).

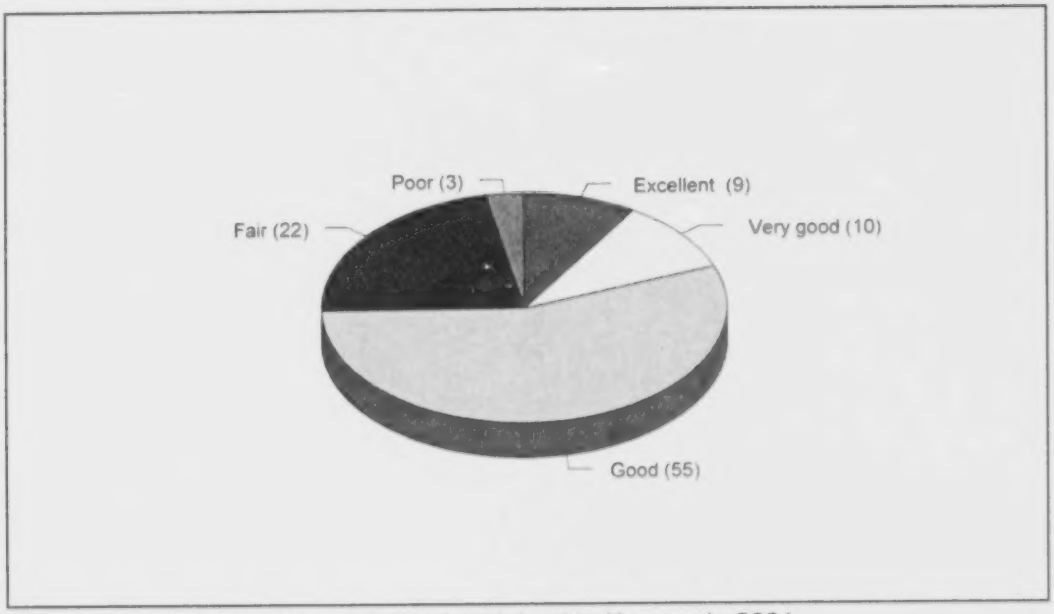

Figure 12 How Inuit women rated their health, Kugaaruk, 2001

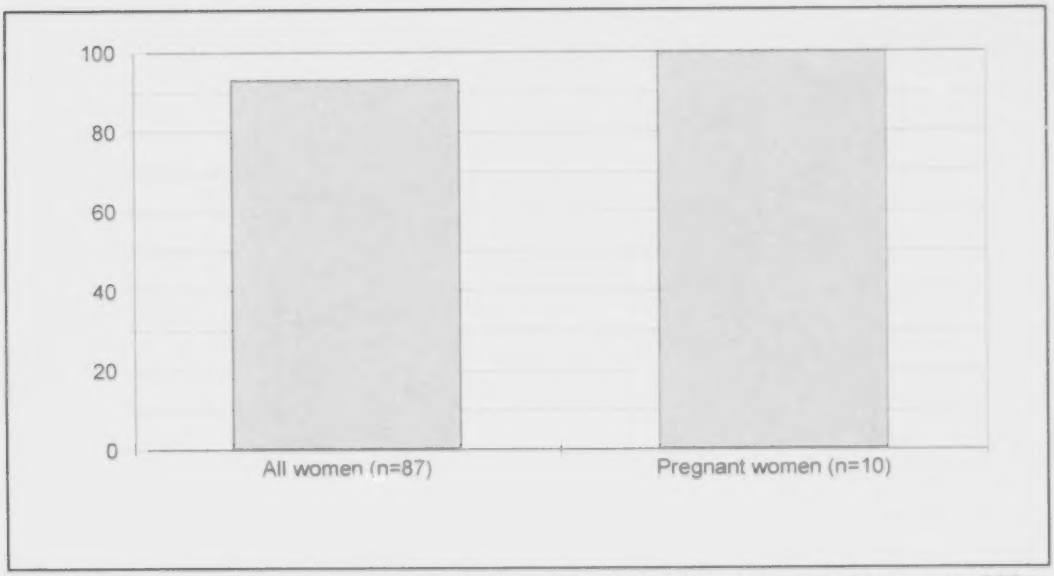

Figure 13 Smoking rates among Inuit women of child-bearing age, Kugaaruk, 2001

Table 17. Smoking, Inuit women, Kugaaruk, 2001

Smoking rate among Inuit women	**%**
All women (n=87)	93
Pregnant women (n=10)	100
Average age Inuit women started smoking (n=84)	14
Frequency of smoking among Inuit women smokers (n=81)	%
Every day	95
Occasionally	5
Total	100
Average number of cigarettes per day (Inuit women)	
All women	9
Pregnant women	7

Weight-related health risks

The BMI includes both height and weight and is used to provide an estimate of body fat. It is an indicator of health problems associated with underweight, overweight and obesity. There is a continuous relationship between BMI and the risk of illness and death [49].

In Canada obesity has been increasing among adults in the general population over the past two decades [50 51 52]. This condition is also prevalent among Inuit [1 53]. According to the Canadian Guidelines for Body Weight Classification, the classification system established for Canadians in general applies to Inuit populations [49]. However, it is important to note that little research has been done to establish the health risks associated with body weight and body fat distribution among Inuit and that some racial/ethnic groups may be more susceptible to health problems associated with obesity than others.

Weights and heights were available for a total of 76 non-pregnant Inuit women. Every effort was made to convince the participants to have their weight and height measurements recorded at the clinic. However, due to very poor weather conditions, a lack of babysitters and a general reluctance among participants to be weighed, we were only able to do clinic measurements for 18 women. Many of the women were familiar with their weight. As a measure of overweight in a population, self-reported weights and

heights are considered appropriate for adults up to 60 years of age [54]. Most studies have found that self-reported weights tend to underestimate actual weight and overestimate height, and this is especially true among overweight women [55, 56, 57]. This issue has only been examined for the Inuit population by Kuhnlein et al. They found no statistically significant differences between self-reported weight and measured weight for the same group of individuals [3]. However, the distribution of weights and heights of those who refused to provide these measurements by one method or the other may differ from the distribution of reported measurements.

Only 35% of non-pregnant Inuit women had a BMI between 18.5 and 24.9, which is considered the healthy range (Figure 14). Sixty-one percent had a BMI of 25 or more, a level considered to increase the risk of certain chronic diseases, including heart disease, hypertension, type 2 diabetes, insulin resistance, osteoarthritis, some types of cancer and gallbladder disease. 8% had a BMI of 30.0 to 34.9 (high risk), 13% a BMI of 35.0 to 39.9 (very high risk) and 12% were at extremely high risk with a BMI over 40 [49].

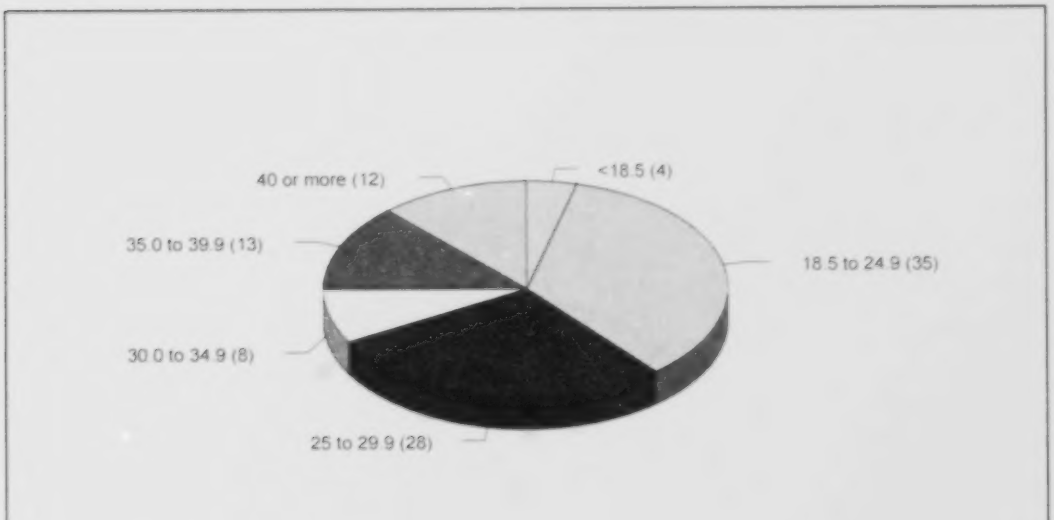

Figure 14 Percent of non-pregnant Inuit women by BMI category, Kugaaruk, 2001

Until recently, the waist/hip ratio (WHR) was thought to be of greater significance to the risk for heart disease and diabetes than the BMI, the risk increasing at a WHR of 0.88 or more for women. A high WHR ratio may be related to the "thrifty gene" concept which

suggests that people coming from a harsh environment, where food supplies are often scarce, develop an ability to store fat more efficiently. This promotes weight gain and predisposes an individual to insulin resistance. The WHR ratio is strongly correlated with the presence of insulin resistance, and is considered one of the components of the metabolic syndrome (high levels of triglycerides, low density lipoprotein-apoprotein B and uric acid and/or microalbuminuria) so prominent in Type 2 diabetes and in cardiovascular disease [58 59]. Unfortunately, only 43 non-pregnant women had waist-hip measurements taken, so the sample may not be representative. Of these, 49% had a WHR of 0.88 or more.

Waist circumference (WC) is now replacing the WHR as a an indicator of increased health risk associated with obesity [49]. The WC is considered by the World Health Organization (WHO) to be a more practical measure of abdominal fat, which includes under-skin fat and visceral fat (fat around internal organs), is more closely related to health risk than the WHR and is recommended as an adjunct to the BMI for assessing health risks for those with a BMI in the 18.5 to 34.9 range [60]. A large amount of visceral fat is associated with insulin resistance, hyperinsulinemia, glucose intolerance and hyperlipidemia, all of which are risk factors for type 2 diabetes and cardiovascular disease [60 61 62 63]. In women, a WC of 80 cm or more is associated with an increased risk for Type 2 diabetes and cardiovascular disease. A WC of 88 cm or more is associated with a substantially increased risk of these diseases [64 65]. In this study, only 31 women with a BMI under 35 agreed to a waist circumference measurement. Eighteen percent of these had a WC of 88 cm or more, placing them at substantially increased risk of obesity-related diseases.

Activity level

In response to the question on general activity levels, 14% of Inuit women were sedentary, 43% were engaged in light activity, 23% were moderately active and 20% very active. Most women spent less than one month on the land in the past year.

Energy and Macronutrient Intake

Energy

Estimating energy requirements is a complex task, since requirements are influenced by a number of factors, including age, sex and activity level. The best way to estimate energy requirements is to consider the BMI in relation to age and sex plus activity level. The questions used in this survey to assess physical activity were very general, and did not provide a precise description of activity patterns. More detailed questions are available based on the number of minutes per day spent on different activities. However, these activities are ones commonly engaged in by southern Canadians and do not include common activities of the Inuit (e.g., hunting, fishing, snowmobiling, picking berries, etc.). Energy requirements are believed to increase by 5% in cold climates, and there can be an additional energy cost (2 to 5%) due to the increased weight of clothing, especially in active individuals [66 67].

Table 18 presents means and medians for energy and macronutrient intake for two groups: women who were not pregnant or lactating, and lactating women. Mean energy intake was 1983 Calories for women who were not pregnant or lactating, and 2034 for lactating women. Energy intake was positively related to BMI, but this trend was not statistically significant ($p=0.2$). Caloric intake decreased with age ($p<0.01$) and BMI tended to increase with age ($p=.07$). A higher BMI in spite of reduced caloric intake may be evidence of under-reporting, although it may also indicate that the reduction in caloric intake among older women has not kept pace with the reductions in energy requirements or activity level.

Mean energy intakes from food groups are shown in Table 19. Meat, Poultry and Fish provided 23% of energy, only 43% of which came from country food. Frozen fried breaded chicken accounted for 18% of the energy contribution of this group. Foods of Little Nutritional Value (mainly pop and fruit drink crystals without vitamin C) were also an important source of energy (19%). Dairy Products, Fruit and Vegetables, Eggs and Alternates contributed a total of 12% of energy, compared to 28% from Sugar and Sweets.

Table 18. Mean and median energy and macronutrient intake, Inuit women, 15 to 44, Kugaaruk, 2001

	Not pregnant or lactating (n=62)		Lactating (n=18)	
	Mean	**Median**	**Mean**	**Median**
Calories	1983	1908	2034	2175
Protein (g)	84	70	93	89
Carbohydrate (g)	269	260	260	233
Fat (g)	64	56	69	61
Trans Fatty Acids (g)	1.2	0.3	0.7	0.1
Saturated Fatty Acids (g)	23.5	21.1	22.9	22.4
Polyunsaturated Fatty Acids (g)	9.1	7.6	11.5	9.6
Cholesterol (mg)	228	177	300	202
Total sugars (g)	135	124	121	122
Dietary fibre (g)	7.9	6.4	7.3	6.7
Alcohol (g)	0	0	0	0
Caffeine (mg)	421	251	283	188
% energy distribution				
Protein	17		18	
Carbohydrate	54		51	
Fat	29		31	
Saturated fat	10.7		10.1	

Table 19. Mean energy intake (Calories) from food groups and Food Mail categories, Inuit women, Kugaaruk, 2001

Food group	Food Mail category	Mean	% of total
Dairy Products	Priority Perishable	13	0.6
	Nutritious Perishable	23	1.1
	Non-perishable	25	1.2
Eggs	Priority Perishable	14	0.7
Meat, Poultry, Fish	Nutritious Perishable	151	7.4
	Non-perishable	30	1.5
	Country	201	9.9
	Convenience Perishable	86	4.2
Alternates	Nutritious Perishable	16	0.8
Cereal Products	Nutritious Perishable	65	3.2
	Non-perishable	207	10.1
Fruits, Vegetables	Priority Perishable	23	1.1
	Nutritious Perishable	113	5.5
	Non-perishable	20	1.0
Fats, Oils	Nutritious Perishable	42	2.1
	Non-perishable	24	1.2
	Country	0.5	0.02
Sugar, Sweets	Non-perishable	214	10.5
Miscellaneous	Nutritious Perishable	148	7.2
	Non-perishable	153	7.5
	Convenience Perishable	85	4.2
Foods of Little Nutritional Value		387	18.9
Cereal Products		7	0.3
Potato chips		16	0.8
Sweets		362	17.7
Miscellaneous		1	0.05
Total		2040	100.0

Sources of energy

For women who were not pregnant or lactating, protein and carbohydrate accounted for 17% and 54% of energy, respectively (Figure 15, Table 18). The percentage of carbohydrate was well within nutrition guidelines (45 to 65%). Fat provided 29% of energy, which is also within current nutrition guidelines (20 to 35% of energy), but saturated fat provided 10.7% of energy intake, higher than the generally recommended limit (8 to 10% of calories). Mean intake of trans fatty acids was 1.2 grams. However, since trans fatty acid data in the CNF are missing for a number of foods, including French fried potatoes, potato chips, crackers and cookies, actual intake would be much higher than this amount. French fries are estimated to contain between 1.72 and 3.38 grams of trans fatty acids per 100 grams [68]. If these values were included, the mean trans fatty acid intake would be between 2.2 grams and 3.1 g per day. Trans fatty acid intake is positively associated with blood total and low density lipoprotein (LDL) cholesterol concentration, and therefore with a higher risk of cardiovascular disease [69]. Some investigators have found trans fatty acids associated with a higher risk of Type 2 diabetes [70]. Median intakes of cholesterol were within the recommended range of 300 mg/d or less.

Among lactating women, protein, carbohydrate and fat accounted for 18%, 51% and 31% of energy, respectively, and saturated fat accounted for 10.1% of energy.

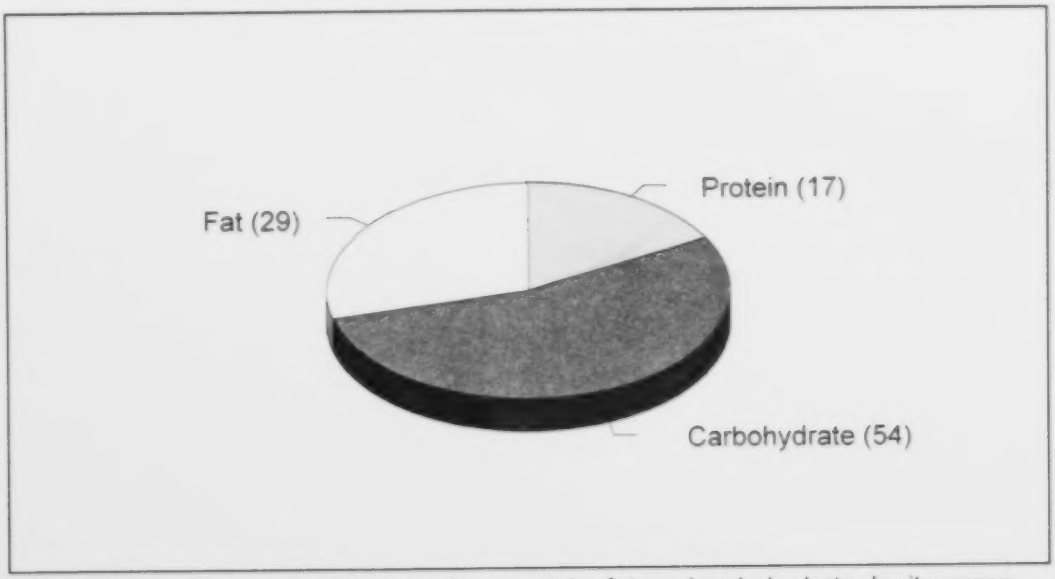

Figure 15 Percentage of energy from protein, fat, and carbohydrate, Inuit women (not pregnant or lactating), Kugaaruk, 2001

Protein, fat and carbohydrate

For women who were not pregnant or lactating, mean intake of protein, carbohydrate and fat was 84 grams, 269 grams and 64 grams, respectively (Table 18). Mean saturated fat intake was 23.5 grams. Protein intake was lower and carbohydrate intake higher than in all previous INAC surveys of Inuit women in this age group [1]. For lactating women, mean intake of protein, carbohydrate and fat was 93 grams, 260 grams and 69 grams, respectively.

Individuals who are genetically susceptible to obesity are more likely to gain weight on a high-fat diet than those who lack these genes. High intakes of saturated fat, trans fatty acids and cholesterol increase blood total and LDL cholesterol concentrations and, therefore, the risk of cardiovascular disease. There is some evidence that individuals with a high WHR may respond differently to high-fat diets than those with a normal WHR, depositing more fat in the abdominal area [71].

In animal studies, a high-fat (mostly saturated), refined-carbohydrate (sucrose) diet tends to favour obesity and an increase in plasma total cholesterol, LDL cholesterol and triglycerides, while a low-fat, complex carbohydrate diet does the reverse [72 73]. The Acceptable Macronutrient Distribution Ranges for fat are based on evidence indicating a risk for cardiovascular disease with low intakes of fat and high intakes of carbohydrate, and the evidence for increased risk of obesity and obesity-related diseases with high intakes of fat [69]. Traditional Inuit diets were very high in protein, and although they may have been just as high in fat as current levels, it is believed that the traditional high-protein and low-carbohydrate intake would favour low levels of LDL cholesterol. The fat consumed in the traditional diet would have contained a higher percentage of omega-3 fatty acids, and less saturated fat than is the case today. There is growing evidence that omega-3 fats may provide some protection against cardiovascular disease. The traditional lifestyle, which relied heavily on marine mammals to provide an abundant supply of antioxidants such as vitamin A, vitamin E and selenium, together with a more active lifestyle, less stress, less smoking, and a lower salt intake, may have acted together to protect against heart disease and diabetes [74].

Sources of fat and saturated fat

The major food sources of fat, in descending order of importance, were store meats (27%), pizza, country food (9%), Foods of Little Nutritional Value, packaged sandwiches and burgers, margarine and butter, and frozen French fried potatoes (Table 20). Saturated fat came mainly from store meat (26%), Foods of Little Nutritional Value (chocolate bars and coffee whitener), pizza, country food (8%), butter and margarine and canned stew.

Table 20. Mean fat and saturated fat intake (grams per day) from major sources, Inuit women, Kugaaruk, 2001

Food group	Food Mail category	Fat		Saturated fat	
		Mean	% of total	Mean	% of total
Dairy Products	Priority Perishable	1	1	0.6	3
	Perishable	1	2	0.7	3
	Non-perishable	1	2	0.9	4
Meat, Poultry, Fish	Nutritious Perishable	11	16	4.1	17
	Non-perishable	2	4	0.9	4
	Country	6	9	2.0	8
	Convenience Perishable	5	7	1.3	5
Fruits, Vegetables	Priority Perishable	1	1	0.0	0.03
	Perishable	4	6	0.8	3
Fats, Oils	Nutritious Perishable	5	7	1.8	8
	Non-perishable	3	4	0.9	4
	Country	0.1	0.1	0.0	0.1
Miscellaneous	Nutritious Perishable	8	11	2.5	11
	Non-perishable	4	6	1.6	7
	Convenience Perishable	5	8	1.7	7
Foods of Little Nutritional Value		6	9	3.3	14
Total (all sources)		67		23.9	

Fibre

As in other surveys of Inuit women, median total dietary fibre intake was only about one third of that recommended for good health [75]. This is not surprising, given the low consumption of whole grains, fruits and vegetables. A recent study on the effect of diet on cardiovascular disease, by the Children's Hospital of Boston, Mass., followed 2909 adolescents over a ten-year period. They found that fibre consumption was a stronger predictor of insulin levels, weight gain and other cardiovascular risk factors than total fat or saturated fat consumption. They concluded that high-fibre diets may protect against obesity and cardiovascular disease by lowering insulin levels [76]. After reviewing the evidence of the protective effect of fibre against cardiovascular disease, the DRI Committee concluded that the data are strong enough to make a recommendation for fibre intake and to support the claim that an increased fibre intake appears to benefit both men and women in this respect. The data suggest that an intake of 14 grams per 1000 Calories per day, particularly from cereals, will promote heart health [69].

Caffeine

Mean caffeine intake was 421 mg for non-pregnant, non-lactating women (within Canadian health guidelines for adults but higher than maximum levels of 300 mg per day recommended for women who are planning to become pregnant) and 283 mg for lactating women [77].

Vitamins

Adjusted mean and median vitamin intakes and the percentage of women with intakes below the EAR are presented in Table 21. Data were not analysed for pregnant women due to the small sample size. Since the median age was 27 for women who were not pregnant or lactating, and 26 for the lactating group, we used the EARs/AIs for women 19 to 30 for both groups. The EARs for lactation were based on the requirements for the first six months. Median intakes, as well as the percentage below the EAR, are missing for some nutrients because the Iowa State University program was unable to find a transformation to produce a normal distribution for these nutrients.

Table 21. Adjusted mean and median vitamin intake of Inuit women, 15 to 44, and percent with inadequate intake, Kugaaruk, 2001

		Not pregnant or lactating (n=62)			
		Mean	Median	EAR	% <EAR
Vitamin A	RE	335	323		
Vitamin C (Smokers)	mg	128	85	95	54
Vitamin C (Non-smokers)	mg	128	85	60	38
Thiamin	mg	1.36	1.30	0.9	12
Riboflavin	mg	1.47	1.41	0.9	6
Niacin	NE	36	33	11	0
Vitamin B6	mg	1.09	1.04	1.1	57
Dietary Folate Equivalents	mcg	288	282	320	68
Vitamin B12	mcg	10.0	8.7	2	2

		Lactating (n=18)			
		Mean	Median	EAR	% <EAR
Vitamin A	RE	251	231		
Vitamin C (Smokers)	mg	120	103	135	67
Vitamin C (Non-smokers)	mg	120	103	100	48
Thiamin	mg	1.51	1.44	1.2	28
Riboflavin	mg	1.35	1.33	1.3	45
Niacin	NE	32	32	13	0
Vitamin B6	mg	1.04	1.04	1.7	100
Dietary Folate Equivalents	mcg	417	375	450	63
Vitamin B12	mcg	4.0	–	2.4	–

Note: The EAR represents the average daily nutrient intake level estimated to meet the requirements of half the healthy individuals in a particular life stage and gender group. The proportion with an intake below the EAR is considered to have a usual inadequate intake.

Dashes ("–") indicate that the character of the data was such that the C-SIDE software was unable to calculate a median or the percentage of the population with an intake below the EAR.

Vitamin A

Among women who were not pregnant or lactating, mean and median intakes of vitamin A were 335 RE and 323 RE, respectively. Mean intake was lower than that found in Repulse Bay (441 RE) and Pond Inlet (659) in 1997 [1]. Among lactating women, mean vitamin A intake was only 251 RE (Table 21).

The EAR for vitamin A is now expressed in Retinol Activity Equivalents rather than Retinol Equivalents. This new measure reflects changes to the conversion factors for carotenoids based on the most recent research [78]. Unfortunately, nutrient data for the Retinol Activity Equivalent of foods are not yet available, so that it was not possible to assess the probability of inadequacy of vitamin A.

Vitamin A is important for normal vision, gene expression and embryonic development and normal immune function. An inadequate intake may result in night blindness, embryonic lung defects, impaired T-cell function and a higher risk of respiratory infections and diarrhea. Vitamin A also interacts with other nutrients including iron. A number of studies suggest that vitamin A deficiency impairs haemoglobin formation and therefore vitamin A supplementation in combination with iron may be more effective than iron alone in the treatment of anaemia [79].

Preformed vitamin A is obtained from animal foods. It can also be manufactured in the body from provitamin A carotenoids found in dark green or orange fruits and vegetables. The most important traditional Inuit sources of vitamin A (retinol) are seal liver and eyes, narwhal blubber and polar bear fat – foods that were not reported on the 24-hour recall. Store foods rich in vitamin A include beef or pork liver, carrots, squash, frozen mixed vegetables, tomato sauce, cheddar cheese, eggs and margarine. In this survey, the major sources of vitamin A were country food (mainly Arctic char), frozen mixed vegetables, butter and margarine (Table 22). Other traditional foods (e.g., muktuk, marine mammal fat, and liver) that are rich sources of vitamin A were not being consumed at the time of the survey. It is possible that vitamin A intake would be higher in other seasons when these foods are more available.

Table 22. Mean vitamin A intake (RE per day) from major sources, Inuit women, Kugaaruk, 2001

Food Mail category/food group	RE	% of total
Priority Perishables		
Dairy Products	8	3
Eggs	16	5
Vegetables	64	20
Nutritious Perishables		
Dairy Products	8	3
Fats and Oils	43	13
Miscellaneous	24	7
Non-perishable		
Dairy Products	10	3
Miscellaneous	29	9
Country food	75	23
Convenience Perishable		
Meat, Poultry, Fish	7	2
Miscellaneous	23	7
Total (all sources)	322	

Vitamin B6

Fifty-seven percent of non-pregnant, non-lactating women and 100% of lactating women had an inadequate intake of vitamin B6 because of the higher requirement for lactation (Figures 16 and 17, Table 21). By comparison, the Continuing Survey of Food Intake of Individuals in the United States (CSFII 1994-1996) found 15% of women aged 19 to 50 and 10 to 15% of lactating women had less than the EAR for vitamin B6 [26].

Classic symptoms of vitamin B6 deficiency include dermatitis, microcytic anaemia, depression and confusion. Low intakes of vitamin B6 during pregnancy may lead to poor vitamin B6 status in the infant, resulting in convulsions. The EAR for vitamin B6 is derived by using biochemical indicator cutoffs that have not been linked to clinical or physiological insufficiency. Clinical symptoms of deficiency have only been observed in controlled studies with very low levels of vitamin B6, and have never been documented among non-pregnant women at intakes above 0.5 mg. Depletion-repletion studies of

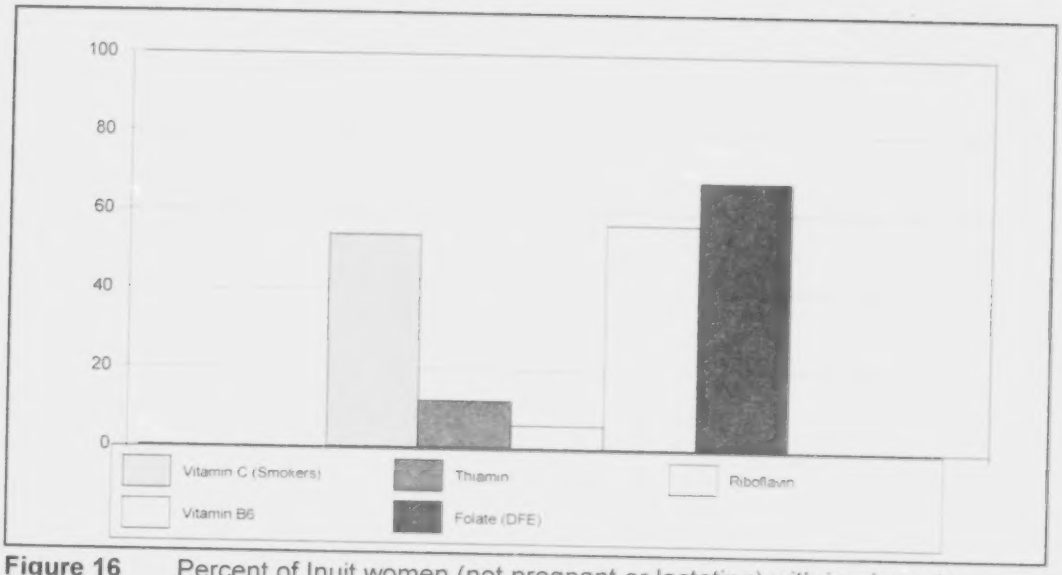

Figure 16 Percent of Inuit women (not pregnant or lactating) with inadequate vitamin intakes, Kugaaruk, 2001

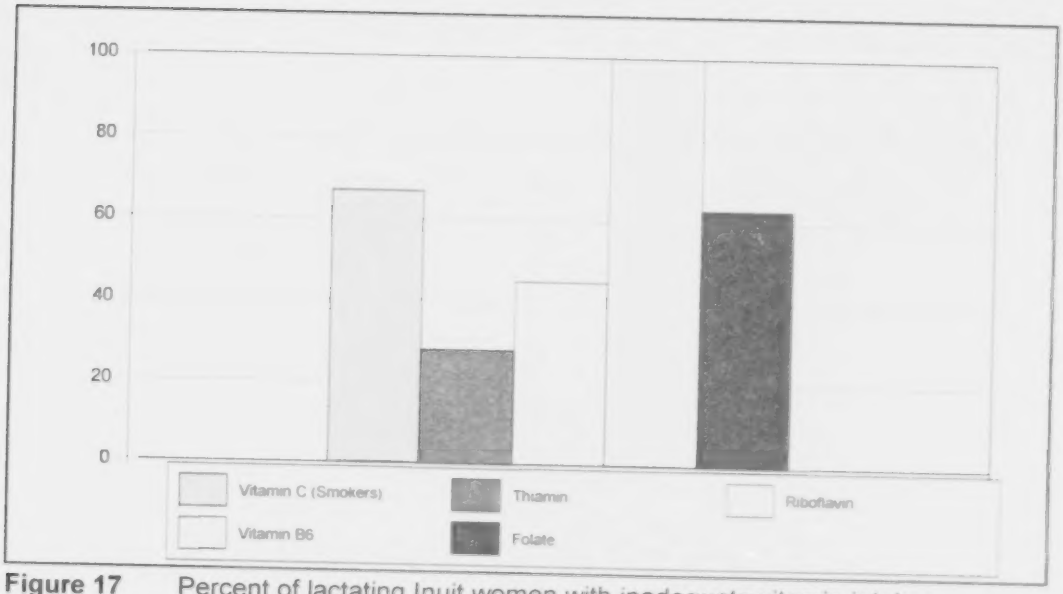

Figure 17 Percent of lactating Inuit women with inadequate vitamin intakes, Kugaaruk, 2001

healthy women, to determine the intake required to return plasma values to their original state, suggest the average requirement of pyridoxine (an indicator of vitamin B6 status) is less than 1.0 mg per day. However, in order to compensate for the bioavailability of vitamin B6 in food, the EAR for women 19 to 30 is set at 1.1 mg of vitamin B6 per day. Vitamin B6 requirements may possibly be higher for individuals on very-high-protein diets [80]. The EAR for lactation is set at 1.7 mg to ensure sufficient B6 in breast milk.

In the traditional diet, organ meats, dried fish, game and marine mammals, and wild birds are the best sources of vitamin B6. Among store foods, beef liver, meat, bananas and highly fortified cereals are good sources. The major sources of vitamin B6 in Kugaaruk were country food (mainly Arctic char), store meat and French fries (Table 23).

Table 23. Mean intake of vitamin B6 (mg per day) from major sources, Inuit women, Kugaaruk, 2001

Food group	Food Mail category	mg	% of total
Dairy Products	Priority Perishable	0.00	0.2
	Nutritious Perishable	0.00	0.3
	Non-perishable	0.01	0.8
Eggs	Priority Perishable	0.01	0.7
Meat, Poultry, Fish	Nutritious Perishable	0.13	11.0
	Non-perishable	0.02	2.0
	Convenience Perishable	0.08	6.7
Fruit, Vegetables	Priority Perishable	0.04	3.1
	Nutritious Perishable (French fries)	0.17	13.8
	Non-perishable	0.03	2.1
Cereal Products	Nutritious Perishable	0.01	1.2
	Non-perishable	0.06	4.9
Miscellaneous	Nutritious Perishable	0.05	3.8
	Non-perishable	0.05	4.1
	Convenience Perishable	0.04	3.3
Country food		0.47	39.0
Foods of Little Nutritional Value		0.03	2.1
Total (all sources)		1.21	

Folate

The DRI Committee examining the requirements for folate recognized that because of limitations in the traditional analytic methods used to estimate the folate content of foods, most nutrient databases underestimate folate intake. Therefore, current folate data may result in an overestimate of the percentage of the population below the EAR [80]. The EAR for folate is expressed as micrograms of Dietary Folate Equivalents (DFEs). This measure acknowledges the greater bioavailability of folic acid added to foods compared to naturally occurring food folate (1 mcg DFE = 1 mcg of food folate and 1 mcg DFE = 0.6 mcg of folic acid added to foods). In this study, means and medians have been expressed in DFEs. Folic acid supplementation of flour and pasta is now mandatory in Canada. The folic acid values in the CNF have now been reduced from original estimates based on the assumption that food manufacturers would add the maximum amount of folic acid allowed under the regulations to an estimate using an average amount, the approach used by the USDA.

Sixty-eight percent of non-pregnant, non-lactating women and 63% of lactating women in Kugaaruk had inadequate folate intakes (Figures 16 and 17, Table 21). A low folate intake (320 mcg or less per day) has been associated with elevated plasma homocysteine levels (greater than 14 µmol/L) [81]. When folate supply to the bone marrow becomes restricted enough to interfere with the formation of red blood cells, macrocytic anaemia may develop. When folate intake is inadequate to support the rapid development of new cells in the fetus (especially those of the brain and nervous system) during the first few weeks of pregnancy, this may result in neural tube defects, including spina bifida, in the newborn [80]. Population-based, case control studies of 468 cases with spontaneous abortion and 921 controls found that women with low plasma folate levels were at increased risk of spontaneous abortion [82]. Women who smoke may also be at greater risk for folate deficiency and spontaneous miscarriage, especially if they carry the mutant gene, methylyenetetrahydrofolate reductase 677IT, which is involved in the metabolism of folate [83]. This would suggest that women who smoke would benefit from higher doses of folic acid prior to conception.

Traditional sources of folate include liver and other organ meats, seaweed, berries and wild plants. Store foods rich in folate include orange juice, sunflower seeds, fortified flour, dark green vegetables, peas and beans.

Cereal Products (mainly pasta, rice and flour) were clearly the most important sources of folate (50%) (Table 24). Miscellaneous foods (mainly macaroni and cheese dinner, pizza and tea) contributed 30%. Fruits and vegetables provided only 5%. In the southern Canadian diet, fruit, fruit juice and vegetables are also rich sources of folate.

However, these foods have never been important in the Inuit diet. In this study, women consumed an average of one serving of fruits and vegetables per day.

Table 24. Mean Dietary Folate Equivalent intake (mcg per day) from major sources, Inuit women, Kugaaruk, 2001

Food group	Food Mail category	mcg	% of total
Dairy Products	Priority Perishable	0.3	0.1
	Nutritious Perishable	1.0	0.3
	Non-perishable	1.4	0.5
Eggs	Priority Perishable	5.1	1.7
Fruit, Vegetables	Priority Perishable	7.8	2.6
	Nutritious Perishable (French fries)	6.7	2.2
	Non-perishable	1.5	0.5
Cereal Products	Nutritious Perishable	30.1	9.9
	Non-perishable	120.5	39.9
Miscellaneous	Nutritious Perishable	21.2	7.0
	Non-perishable	54.4	18.0
	Convenience Perishable	15.6	5.1
Country food		15.6	5.0
Foods of Little Nutritional Value		6.2	2.0
Total (all sources)		302	

Vitamin C

Smoking depletes vitamin C stores in the body, increasing the EAR by 58%. In this study, we present the EAR for smokers and non-smokers, but since the majority of women, including pregnant and lactating women, were smokers, the EAR for smokers is more appropriate. Using this standard, approximately 54% of non-pregnant, non-lactating women and two thirds of lactating women had an inadequate intake of vitamin C [84] (Figures 16 and 17, Table 21).

It is important to note that the EAR for vitamin C is considerably higher than that required to prevent vitamin C deficiency, so that the percentage below the EAR does not mean these women were at risk of deficiency. Severe vitamin C deficiency leads to scurvy, a condition caused by a breakdown of connective tissue, characterized by inflamed and bleeding gums and impaired wound healing. Individuals made vitamin C deficient, but not scorbutic, showed signs of inflamed gums and fatigue [85 86].

Traditional dietary sources of vitamin C would include raw meat, caribou stomach contents, seaweed, berries and wild plants. The richest sources of vitamin C among store foods include oranges, orange juice, apple juice with added vitamin C, peppers and cabbage.

In Kugaaruk, fruit drink crystals provided 81% of the vitamin C and fruits and vegetables only 13%.

Niacin, thiamin, riboflavin and vitamin B12

Among women who were not pregnant or lactating, there was very little or no risk of inadequate intake of niacin or thiamin (Table 21). However, since the EAR for thiamin is higher for lactation, 28% of lactating women had an inadequate thiamin intake (Table 21, Figure 17).

Thiamin is essential for carbohydrate and protein metabolism. The early signs of deficiency include anorexia, weight loss, mental changes such as apathy, decrease in short-term memory, confusion, irritability, muscle weakness and cardiovascular changes such as enlarged heart [60].

Caribou, marine mammals, and dried meat would be rich sources of thiamin. The major store food sources are fortified or enriched or whole grain products such as bread, grains and ready-to-eat cereals. Ham and pork are also rich sources of thiamin. In Kugaaruk, thiamin came mainly from non-perishable cereal products, store meats and poultry and country food.

Riboflavin intake was adequate for most non-pregnant, non-lactating women but, again,

because of the higher EAR during lactation, 45% of lactating women had an inadequate intake (Figure 17, Table 21). Riboflavin is involved in a number of metabolic reactions and in energy production. Early signs of deficiency include sore throat, swelling of throat and a glossy tongue [80]. Again, wild game, marine mammals, fish and liver are excellent sources of riboflavin. The best store food sources are milk, bread and fortified cereals. Country food and non-perishable cereal products were the main sources of riboflavin.

Only two percent of women had an inadequate intake of vitamin B12 (Table 21). This vitamin is essential for normal blood formation and neurological function. A deficiency results in pernicious anaemia, with symptoms similar to folate deficiency anaemia. Neurological effects of vitamin B12 deficiency include numbness and tingling of extremities, especially in the lower limbs, dizziness, loss of concentration, memory loss, disorientation, dementia, visual disturbances, insomnia, impotency and impaired bowel and bladder control.

B12 comes mainly from animal foods, especially red meats, shellfish like mussels, clams, oysters and organ meats, milk and yogurt, and fortified cereals. Eighty-three percent of the vitamin B12 in Kugaaruk came from country food. Other sources included store meat and poultry and packaged sandwiches and burgers.

Minerals

Adjusted means, medians and the percentage of women who had inadequate intakes of selected minerals are presented in Table 25.

Among non-pregnant, non-lactating women, intakes of phosphorus, zinc, and copper were adequate.

Table 25. Adjusted mean and median mineral intake of Inuit women, 15 to 44, and percent with inadequate intake, Kugaaruk, 2001

		Not pregnant or lactating (n=62)			
		Mean	Median	EAR/AI*	% <EAR
Calcium	mg	485	461	1000*	
Iron~	mg	12.6	12.4	8.1	14
Magnesium	mg	191	187	255	91
Phosphorus	mg	1096	1037	580	4
Zinc	mg	10.5	10.4	6.8	5
Copper	mcg	1015	990	700	4
Manganese	mg	2.32	2.26	1.8*	
		Lactating (n=18)			
		Mean	**Median**	**EAR/AI***	**% <EAR**
Calcium	mg	458	–	1000*	
Iron~	mg	12.0	12.0	6.5	
Magnesium	mg	201	189	255	82
Phosphorus	mg	953	937	580	1
Zinc	mg	9.8	9.3	10.4	66
Copper	mcg	1022	960	1000	55
Manganese	mg	3.07	2.69	2.6*	

Note: Means are adjusted by the C-SIDE software program.

The EAR represents the average daily nutrient intake level estimated to meet the requirements of half the healthy individuals in a particular life stage and gender group. The proportion with an intake below the EAR is considered to have a usual inadequate intake.

* Adequate Intakes (AI) are used where EARs are not available. Intakes below the AI cannot automatically be considered inadequate across the population or group.

~ The percentage with an inadequate intake of iron was calculated using probabilities of inadequate intakes for a mixed population of adult women using and not using oral contraceptives. The number of lactating women was too small to perform this analysis.

– The character of the underlying data is such that the C-SIDE program did not produce an estimate of the median.

Magnesium

Ninety-one percent of non-pregnant, non-lactating women and 82% of lactating women had an inadequate intake of magnesium (Table 25).

Inadequate magnesium intake may cause a fall in the calcium concentrations in the blood. Muscle spasms are a clinical feature of emerging magnesium deficiency. More severe deficiency can lead to disturbances in heart rate. Magnesium deficiency may also play a role in the development of osteoporosis [87]. Among traditional foods, the best sources of magnesium are meats, raw and cooked clams, kelp, netted willow and Arctic willow [21]. Store food sources include green leafy vegetables, whole grains and nuts, with lower amounts in meat, fish and poultry.

In Kugaaruk, the major sources of magnesium, in descending order of importance, were Arctic char, coffee, tea, fruit drink crystals, pasta, flour, French fries and caribou (Table 26).

Calcium

For non-pregnant, non-lactating women, mean and median intakes of calcium were 485 mg and 461 mg (Table 25). Mean calcium intake for lactating women was 458 mg. At the present time, there is insufficient scientific evidence to set an EAR for calcium. Instead, based on studies of calcium retention and bone mineral content, the Dietary Reference Intake Committee and its Panel on Calcium and Related Nutrients established an Adequate Intake (AI). This intake is considered sufficient to maintain calcium needs, while recognizing that lower intakes may be adequate for many [87]. In this study, mean and median calcium intakes were less than half the AI. However, since the AI is not based on requirements, nothing can be said about the proportion of the population with inadequate intakes [87].

Inadequate calcium intake during the period of bone formation, combined with inadequate exercise, may lead to osteoporosis in later life. Previous studies among Inuit women have all documented intakes below recommendations [1]. But since calcium requirements vary widely, and absorption is more efficient on a low intake, it is difficult to determine whether current intakes are sufficient. Kuhnlein and coworkers suggest that current nutrient data may underestimate calcium intake in the Baffin Inuit population, which could also be the case here [21]. A recent cross-sectional study of 10 Inuit children 5 to 17 years of age examined the effect of a calcium load on the serum calcium and urinary calcium excretion. The results demonstrated that the Inuit had a distribution of vitamin D receptor genotypes similar to that of some Asian populations and significantly different from the white population. This genotype is believed to be an adaptation to a low-calcium diet, enabling a more efficient intestinal absorption of calcium. This genetic difference is believed to enable the Inuit to mineralize their bones and maintain calcium balance with a significantly lower calcium intake than is recommended for the standard American diet. The authors caution that dietary calcium intakes based on the DRIs may

result in hypercalciuria and renal damage for this population [65]. However, it is important to recognize the limitations of such a small cross-sectional study, especially with children whose calcium requirements are known to fluctuate. More rigorous research involving longitudinal studies would be necessary to confirm these results.

Table 26. Mean magnesium intake (mg per day) from major sources, Inuit women, Kugaaruk, 2001

Food group/Food Mail category	mg	% of total
Dairy Products		
Priority Perishable	1	1
Nutritious Perishable	3	2
Non-perishable	4	2
Meat, Poultry, Fish		
Nutritious Perishable	10	5
Non-perishable	2	1
Convenience Perishable	6	3
Cereal Products		
Nutritious Perishable	6	3
Non-perishable	14	7
Fruit and vegetables		
Priority Perishable	6	3
Nutritious Perishable	12	6
Sweets		
Non-perishable	4	2
Miscellaneous		
Nutritious Perishable	9	5
Non-perishable	47	24
Convenience Perishable	5	2
Country food	40	20
Foods of Little Nutritional Value	19	10
Total (all sources)	199	

In a study of Baffin foods, the best sources of calcium were caribou stomach contents, Arctic char skin, whole sculpin with bones, boiled duck, clams, and plants such as kelp, sorrel, netted willow and Arctic willow [21]. Among store foods, the best sources are milk, cheese, yogurt and canned salmon and sardines (with the bones).

In Kugaaruk, calcium came mainly from fruit drink crystals, pizza, macaroni and cheese dinner, cheese, evaporated milk, baking powder, and packaged sandwiches and burgers (Table 27).

Table 27. Mean calcium intake (mg per day) from major sources, Inuit women, Kugaaruk, 2001

Food group/Food Mail category	mg	% of total
Dairy Products		
Priority Perishable	30	6
Nutritious Perishable	14	3
Non-perishable	47	10
Cereal Products		
Nutritious Perishable	26	5
Non-perishable	16	4
Sweets		
Non-perishable	55	12
Miscellaneous		
Nutritious Perishable	77	16
Non-perishable	61	13
Convenience Perishable	27	6
Country food	26	5
Foods of Little Nutritional Value	51	11
Total (all sources)	479	

Iron, zinc and copper

Fourteen percent of non-pregnant, non-lactating women had an inadequate intake of iron. Among lactating women, 66% had an inadequate intake of zinc and 55% of copper, because of the higher requirements during lactation *(Table 25)*.

Iron deficiency leads to impaired work performance, anaemia and adverse pregnancy outcomes [78].

The body has the ability to regulate the excretion of zinc when body stores are low, so zinc deficiency is rare, except in cases of general malnutrition, alcoholism or other diseases which affect its absorption. Impaired growth and a depressed immune function are the most prominent features of mild zinc deficiency.

Copper is involved as a cofactor in a number enzymes that play an important role in immune and cardiac function, connective tissue generation and repair and in the prevention of iron-deficiency anaemia. Copper deficiency is rare, but symptoms of an inadequate intake include anaemia.

The best traditional food sources of iron and zinc are red meats, particularly dried narwhal, dried beluga, dried caribou and ringed seal eyes [21]. Iron and zinc are also found in certain seafood such as mussels and oysters, and whole grains. Major food sources of copper include organ meats, seafood, nuts and seeds, wheat bran and whole grains.

Low iron, zinc and copper intakes among some women may be due to seasonal differences in consumption of country food, reflecting a high consumption of fish and a lower than normal consumption of seal and caribou.

Energy and Nutrient Contribution by Food Mail Category

Country food

Country food was the most important source of protein (40%), niacin (44%), vitamin B6 (39%), vitamin B12 (83%) and cholesterol (35%) and an important source of vitamin A (23%), thiamin (29%), riboflavin (38%), iron (23%) and zinc (27%) (Figure 18, Table 28). It was not an important source of fat, vitamin C, folate or calcium. Country food provided only 10% of energy, the lowest percentage reported in any nutrition surveys among the Inuit population in northern Canada.

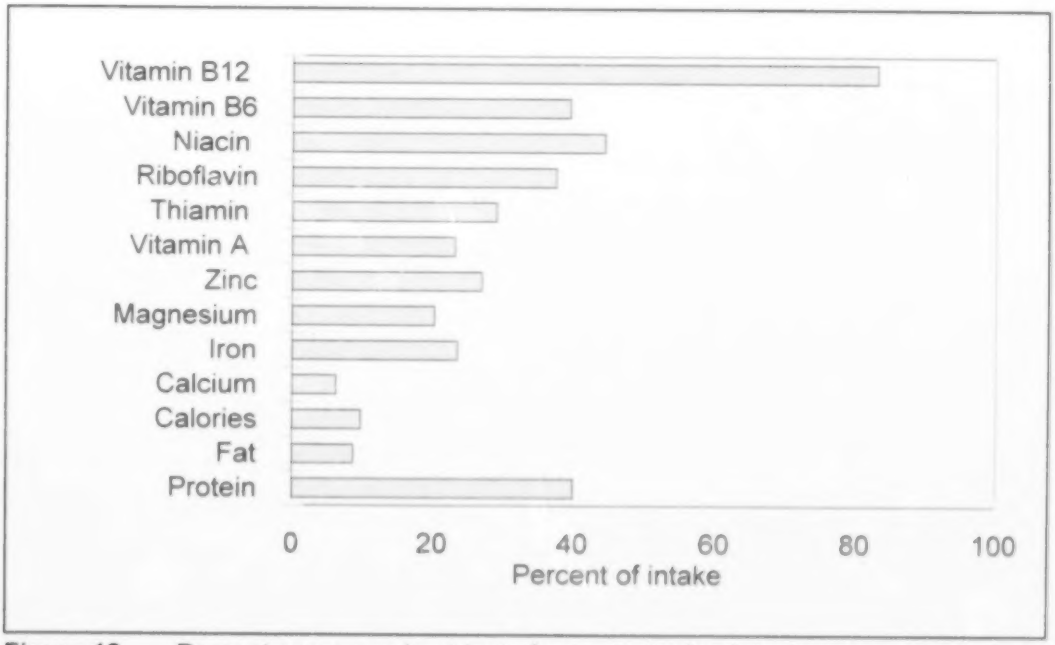

Figure 18 Percent energy and nutrients from country food, Inuit women, Kugaaruk, 2001

Table 28. Mean daily amount of energy and selected nutrients obtained by Food Mail category, Inuit women, Kugaaruk, 2001

	Country food	Priority Perishable food	Nutritious Perishable food	Non-perishable food	Convenience Perishable food	Foods of Little Nutritional Value	Total
Amount (g)	140	53	209	1596	67	665	2730
Protein (g)	35	3	23	14	11	2	87
Fat (g)	6	2	31	12	10	6	67
Carbohydrate (g)	0	6	46	128	9	84	273
Calories	202	50	557	673	171	387	2040
Caffeine (mg)	0	0	0	321	0	50	371
Total sugars (g)	0	1	2	64	1	63	132
Dietary fibre (g)	0.0	0.8	3.6	2.7	0.4	0.5	7.9
Calcium (mg)	26	44	135	190	34	51	479
Iron (mg)	2.9	0.3	3.5	4.1	1.0	0.6	12.3
Magnesium (mg)	40	8	46	75	11	19	199
Phosphorus (mg)	371	51	275	263	86	130	1174
Potassium (mg)	115	88	535	689	133	133	1692
Sodium (mg)	81	70	802	1598	304	98	2954
Zinc (mg)	2.7	0.3	3.5	2.0	1.1	0.4	9.9
Copper (mcg)	204	31	230	350	39	150	1006
Manganese (mg)	0.0	0.1	0.5	1.5	0.0	0.3	2.4
Vitamin A (RE)	75	88	77	47	30	4	322
Vitamin C (mg)	1	6	7	136	0	2	152
Thiamin (mg)	0.42	0.03	0.40	0.49	0.08	0.02	1.43
Riboflavin (mg)	0.61	0.08	0.37	0.39	0.11	0.05	1.59
Niacin (NE)	18.0	0.8	10.8	7.2	3.1	0.7	40.8
Vitamin B6 (mg)	0.47	0.05	0.37	0.17	0.12	0.03	1.21
Dietary Folate Equivalents (mcg)	16	13	66	180	21	6	302
Vitamin B12 (mcg)	10.2	0.1	1.1	0.4	0.4	0.0	12.2
Cholesterol (mg)	85	38	65	20	35	1	244
Trans Fatty Acids (g)	0.0	0.0	0.5	0.0	0.5	0.0	1.1
Saturated Fatty Acids (g)	2.0	0.9	10.3	4.5	2.9	3.3	23.9
Polyunsaturated Fatty Acids (g)	2.0	0.2	3.8	1.6	1.5	0.7	9.8

Priority Perishable foods

The Priority Perishable category includes fresh milk (excluding chocolate milk), UHT milk, buttermilk, cheese, processed cheese, cottage cheese, yogurt, yogurt drinks, powdered milk, fresh vegetables, frozen vegetables (excluding French fries and similar potato products), fresh fruit, frozen fruit, frozen juice concentrate and eggs.

As Table 28 Illustrates, the consumption of these foods was very low (a mean of 53 grams per day). These foods (mainly frozen mixed vegetables) provided 27% of vitamin A. Otherwise, they were not an important source of energy and nutrients (Figure 19). T-tests did not reveal any statistically significant differences in the mean intake of folate or vitamin A from fruits and vegetables by socio-economic status (p=.36 for folate and vitamin A) or adult food security status (p=.55 for folate, and p=.09 for vitamin A).

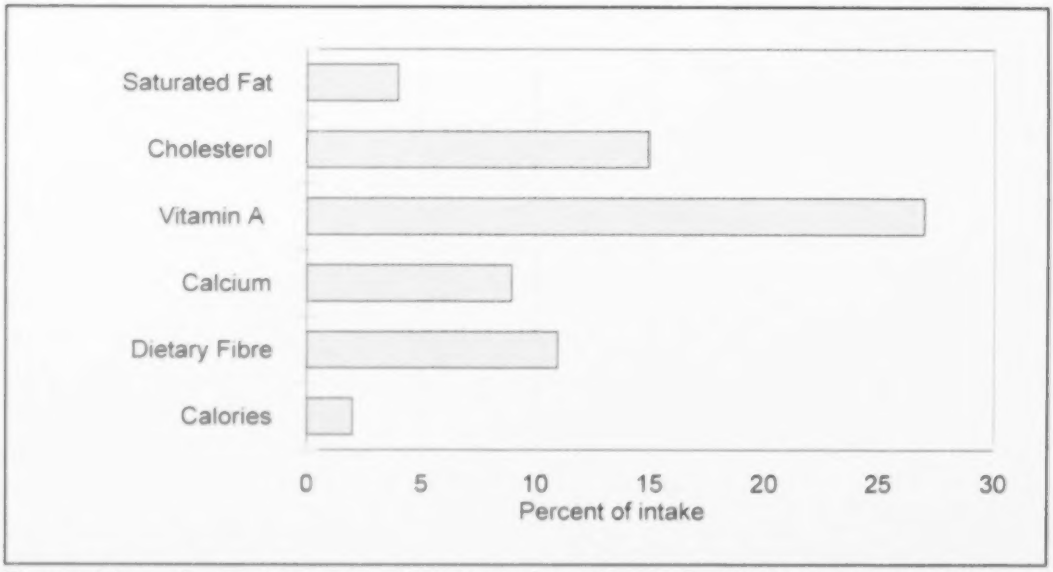

Figure 19 Percent energy and nutrients from Priority Perishable foods, Inuit women, Kugaaruk, 2001

Nutritious Perishable foods

This category includes store Meat, Poultry and Fish, bread and rolls, frozen French fries, margarine and butter, and pizza. Nutritious Perishable foods were a very important source of energy and nutrients (Table 28, Figure 20). They provided 46% of fat and 43% of saturated fat (mainly from high-fat meats, margarine and butter, and pizza), 45% of dietary fibre (from French fries), 28% of calcium (pizza) and iron, 36% of zinc, and 24% of vitamin A (margarine and butter). Nutritious Perishable foods, primarily Meat, Poultry and Fish, were an important source of cholesterol (27%), thiamin (28%), riboflavin (23%) and vitamin B6 (31%). Nutritious Perishables, mainly bread and pizza, provided 22% of DFEs. Margarine was the main source of trans fatty acids (48%), but as noted earlier, the CNF database is incomplete for this nutrient.

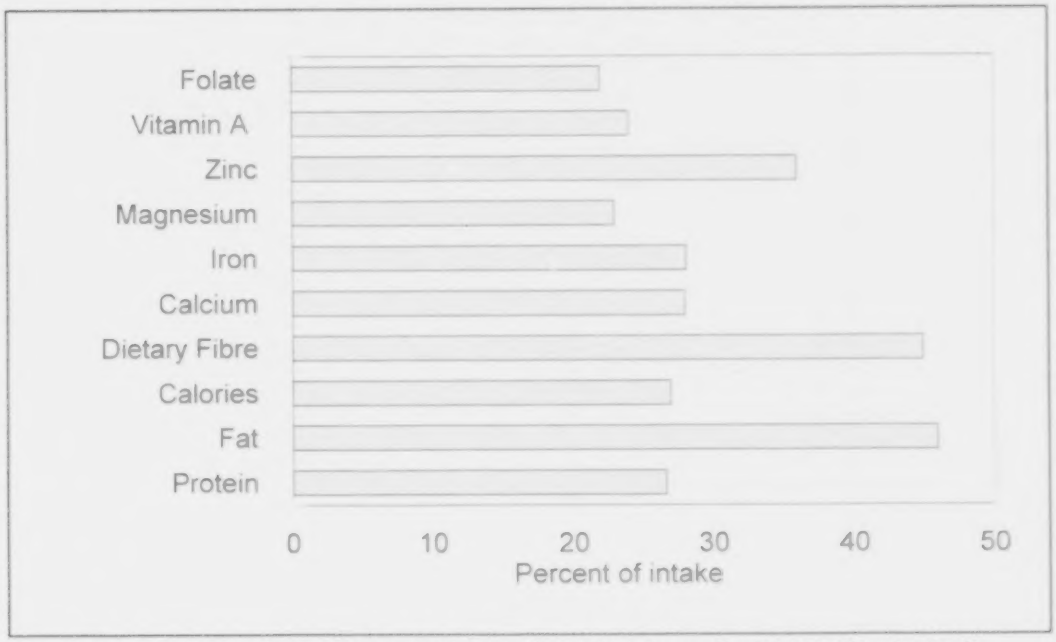

Figure 20 Percent energy and nutrients from Nutritious Perishable foods, Inuit women, Kugaaruk, 2001

Non-perishable foods

Non-Perishable foods, such as fruit drink crystals with vitamin C, soup mixes, flour, rice and pasta, provided almost half of carbohydrate and one third of calories (Table 28, Figure 21). They were the principal source of vitamin C (90%, mainly from fruit drink crystals with added vitamin C), Dietary Folate Equivalents (60%, mainly from flour and pasta) and sodium (54%, mostly from soup mixes). They also provided 40% of calcium (fruit drink crystals with vitamin C, baking powder and evaporated milk).

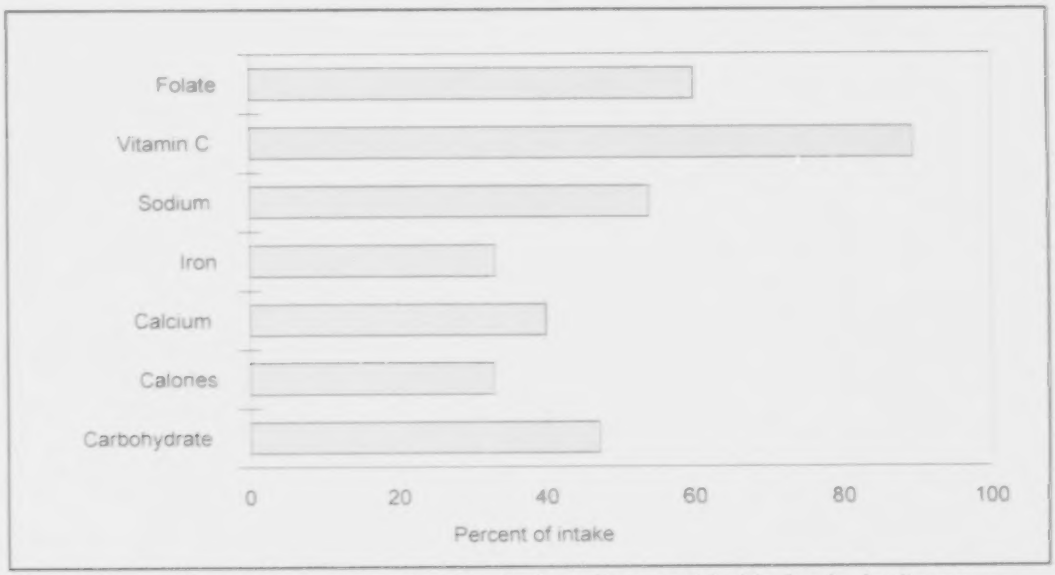

Figure 21 Percent energy and nutrients from Non-perishable foods, Inuit women, Kugaaruk, 2001

Convenience Perishables

This category includes frozen breaded fried chicken and other similar products that are breaded, battered or in pastry, as well as packaged sandwiches and burgers. These foods provided 15% of fat, 14% of cholesterol and 8% of calories (Table 28).

Foods of Little Nutritional Value

This category includes soft drinks, candies, chocolate bars, potato chips, fruit drink crystals without vitamin C, cookies and coffee whitener. In this report, packaged sandwiches and burgers, which were previously considered as part of this category, have been moved to Convenience Perishables.

Foods of Little Nutritional Value provided 19% of calories, 31% of carbohydrate and 48% of total sugars (Table 28, Figure 22). These foods were also a source of 15% of copper, 14% of saturated fat, 11% of calcium and phosphorus and 10% of magnesium. They supplied only 1 to 3% of B vitamins and 1% of vitamin A and vitamin C.

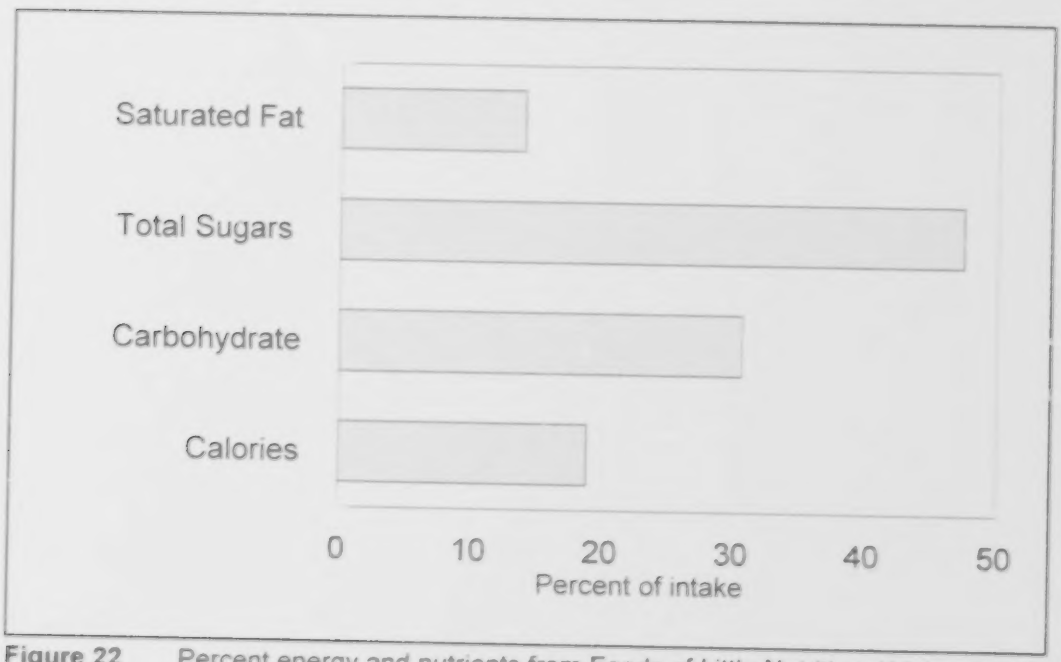

Figure 22 Percent energy and nutrients from Foods of Little Nutritional Value, Inuit women, Kugaaruk, 2001.

Discussion

This study was undertaken to provide baseline data for the Food Mail Pilot Project. The findings will enable INAC to evaluate the impact of reducing the cost of Priority Perishable foods and introducing measures to improve their recognition, quality and variety, in addition to a nutrition education program, on the food security of Kugaaruk households and the nutrient intake of women of child-bearing age.

The report highlights a number of nutrition concerns for Kugaaruk residents, and in particular, for women of child-bearing age. Our findings with respect to food security concerns and food consumption patterns were validated in local meetings with the hamlet council, health care providers and the local project coordinator and through dialogue with community members on the local radio.

At the time of the survey the weekly cost of the Northern Food Basket for a family of four was $327, double that of Yellowknife or Edmonton. For three quarters of families in Kugaaruk, income would be insufficient or barely sufficient to cover the cost of a healthy diet and other necessary family expenditures.

Food security is defined by the American Institute of Nutrition as "access by all people at all times to enough food for an active, healthy life" [89]. They claim that food security "includes at a minimum: (1) the ready availability of nutritionally adequate and safe foods, and (2) an assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing, or other coping strategies)." Food insecurity is defined as "a limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways" [89]. Food insecurity is the deprivation of a basic need and, in the sense it is used here, it results from a lack of financial resources. Food insecurity is undesirable in and of itself, but it is also a possible precursor to nutritional, health, and developmental problems. In 1996, Canada and other countries at the World Food Summit agreed that "food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" [90].

Two thirds of households with children in Kugaaruk had experienced hunger in the past 12 months among either adults or children, or both. In four out of 10 households, both

adults and children experienced hunger because they were unable to afford enough food. This situation demands immediate attention, especially since food insecurity may compromise psychosocial functioning among school-age children as well as their nutrition and health. The fact that more than half of "relatively well-off" households, based on income for the previous month, were food insecure suggests that these families may be helping others in the community or that their income may fluctuate from one month to another. Unfortunately, the small sample size made it difficult to find statistically significant relationships between food insecurity and nutrient intakes.

Among social issues of concern, almost half of Inuit households said they were extremely concerned about not having enough money for food. The level of concern over money for food was second only to the concern over a lack of jobs, indicating that food insecurity places many families under considerable stress.

Paradoxically, despite this level of food insecurity, there was a high prevalence of obesity among women of child-bearing age. However, the prevalence of overweight among food insecure individuals, especially among those who are only mildly food insecure, has been documented in a number of other studies [91 92]. It is of particular interest that about four times as many Kugaaruk women rate their health as "fair" or "poor" as women in the general Canadian population, and the vast majority of women in Kugaaruk, including all those who were pregnant, smoked. Given the degree of food insecurity, the level of smoking and obesity and the low intake of essential micronutrients, it is not surprising that such a high percentage perceive their health status as fair or poor. This is an area that deserves further analysis and clinical investigation of nutrient status.

We did not find a statistically significant relationship between food security status or socio-economic group and mean intakes of calcium, folate and vitamin A. It is possible that such relationships exist, but in view of the inherent day-to-day variation in nutrient intake, the relatively small sample size in this study may have made it impossible to detect any significant differences. Other reasons why such relationships were not found may include the generally low socio-economic status among all socio-economic groups, the general lack of nutritious choices available to the community, the Inuit practice of sharing, and the lack of high quality, reasonably priced Priority Perishable foods. In any event, the high percentage of women with inadequate intakes of folate, vitamin B6, vitamin C and magnesium must be a cause for concern. The nursing staff reported a high prevalence of anaemia among young children and women of child-bearing age, although clinical tests were not performed to determine if the anaemia was due to iron or folate deficiency. The nursing staff also reported poor compliance with vitamin or mineral supplements among women of child-bearing age.

It is important to bear in mind that the EARs are based on the requirements of the general North American population. While the EARs recognize differences in the distribution of requirements of a diverse population, no information is available on the specific nutrient requirements of the Inuit. Further research is needed to estimate the average nutrient requirements of the Inuit, given their present diet and lifestyle. Unfortunately, the effects of an inadequate intake of certain nutrients on health are often subtle and chronic diseases resulting from inadequate intakes take years to develop.

We found a low consumption of country food by women of child-bearing age compared to all other Inuit communities surveyed by INAC since 1992. Also, no organ meats and very little country fat, seal, walrus or muktuk were reported. A more accurate picture of usual consumption would require collecting data in another season. However, since no Country food was reported on the 24-hour recall that did not also appear on the Food Frequency Questionnaire, we felt that the Food Frequency questionnaire did include the most important foods.

For centuries, country food has been central to Inuit health. It has provided most of the essential nutrients. Hunting and fishing and the preparation of country food reinforces Inuit values, provides physical exercise and contributes to a feeling of pride and well-being. Although country food supplies were limited at the time of the survey, community members still felt that women of child-bearing age ate less country food than older adults. The Food Mail Pilot Project will enable the shipment of country food from Cambridge Bay at the Priority Perishable food rate, so this should improve the supply of country food. The nutrition education program will promote consumption of a variety of country food and emphasize ways of using Priority Perishable store foods in combination with country foods in order to facilitate their wider adoption as soon as possible. Food security could be further improved by improving access to country food through the purchase of community freezers or increased financial assistance to hunters, but such measures are beyond the scope of the pilot project.

Unfortunately, the most frequently purchased and consumed store foods are not the most nutritious choices. Consumption of fruits, vegetables, dairy products and whole grain cereals and bread was very low, while consumption of soft drinks, fruit drink crystals without vitamin C and chocolate bars was quite high. The high consumption of "junk food" by women of child-bearing age was also confirmed by our discussions with various community groups and health care providers during our visit to Kugaaruk. The purchase and consumption of Priority Perishable foods, rich sources of vitamin A, vitamin C and folate, was extremely low. Consumers cited cost, poor quality, a lack of variety, and limited availability, as the most important barriers to buying more fresh fruit and vegetables. More importantly, from the point of view of nutrition education, few Kugaaruk consumers said they were not buying more fresh fruit and vegetables

because they preferred canned or frozen products, disliked these foods, felt that these foods are not needed to be healthy, or because they did not know how to prepare them.

Given the concern expressed about alcohol and drug abuse in the community, the zero consumption of alcohol reported on the 24-hour recall may be biassed. This is a dry community and people are unlikely to report consuming alcohol.

The prevalence of obesity among women of child-bearing age in Kugaaruk is a health concern, since obesity increases the risk of chronic diseases, such as heart disease and type 2 diabetes. According to the BMI, 25% of women in Kugaaruk are at very high or extremely high risk of obesity-related diseases. Also, 18% of women with a BMI under 35 had a waist circumference that places them at considerable risk of obesity-related diseases. The level of obesity suggests under-reporting of energy intake, as well as of macronutrients, such as fat and carbohydrate, on the 24-hour recall. It is likely that mean fat and caloric intake would have been higher had potato chips been available at the time of the survey. According to the food frequency questionnaire, potato chips were consumed an average of nine times in the past month.

While a reduction in energy intake would help to improve health by reducing weight, it may decrease the individual's ability to meet her requirement for many nutrients unless more nutrient-dense foods are chosen. Much of the health risk associated with obesity is related to poor physical fitness. By increasing physical exercise, individuals can improve fitness irrespective of changes in weight.

It is evident that food choices must change in order to meet requirements for micronutrients among women of child-bearing age. Vitamin, mineral and fibre intakes could be vastly improved by a few simple changes or substitutions. These could include the following: preparation of breaded skinless oven-baked chicken instead of frozen fried chicken; the substitution of home-made sandwiches and burgers using country meat for packaged sandwiches; replacement of fruit drink crystals with frozen fruit juice; and the use of whole grain breads and cereals instead of white bread and instant white rice. Other changes which would help to improve nutritional status include the promotion of lower-fat dairy products, low-fat meats and non-hydrogenated margarine.

The nutrition and household surveys have demonstrated that the pilot project is appropriately focussed to address some of the major concerns of this community. If successful, it should help to improve food security by lowering the cost of Priority

Perishable foods and thereby improve the intake of essential nutrients such as vitamin A, folate, vitamin C, vitamin B6, calcium, magnesium and fibre.

The pilot project will attempt to improve food security by reducing the cost of Priority Perishable foods. If it also succeeds in reducing the consumption of expensive convenience foods and Foods of Little Nutritional Value, it may indirectly lower food expenditures or improve nutrient intake derived from the same level of expenditure. The nutrition education program being undertaken as part of the pilot project will address some of these issues and encourage more nutritious choices as well as healthier cooking methods.

The pilot project will also provide some training to retail staff and shippers in order to improve marketing and availability of high quality Priority Perishable foods. Special shelf stickers and posters in English and Inuktitut will clearly identify the Priority Perishable foods so that consumers will be better able to make healthier food choices. By lowering the cost of these foods and introducing measures to improve the quality and variety of fresh fruit and vegetables, the pilot project should remove some of the perceived barriers to the purchase of these foods.

Finally, it is important to place these findings in perspective. Obesity, smoking, and a perception of poor health status are common in societies where unemployment is rampant and where there has been radical social change. Poor health behaviours often represent coping strategies by populations under such stress. High food prices contribute to food insecurity, but other factors, such as the purchase of high-cost convenience foods and Foods of Little Nutritional Value, as well as cigarettes, reduce the amount of money available for nutritious food. While the pilot project will help to reduce prices and improve nutrition knowledge and skills, it cannot be expected to completely solve the food security problem or to address all of the underlying problems being experienced by the people of Kugaaruk. Major improvements to the situation in Kugaaruk will require action on many fronts, including the income side, as well as the joint effort of community leaders, health professionals and educators.

References

1. Lawn J. *An update on nutrition surveys in isolated northern communities*. Ottawa: Indian and Northern Affairs Canada, 2002.

2. Lawn J, Harvey D. *Change in nutrition and food security in two Inuit communities, 1992 to 1997*. Ottawa: Indian and Northern Affairs Canada, 2001.

3. Kuhnlein HV, Receveur O, Chan HM, Loring E. *Assessment of dietary benefit/risk in Inuit communities*. Centre for Indigenous Peoples' Nutrition and Environment (CINE) and Inuit Taparisat of Canada. Ste-Anne-de Bellevue, Quebec, August 2000.

4. Lawn J, Langner N. *Air Stage Subsidy Monitoring Program Final Report. Volume 2: Food Consumption Survey*. Ottawa: Indian and Northern Affairs Canada, 1994.

5. Labrador Inuit Health Commission. What you told us ... about nutrition/diet. *What you told us*. 1999 April;1(3):1-4.

6. Institute of Medicine. *WIC nutrition risk criteria: a scientific assessment*. Washington, D.C: National Academy Press, 1996.

7. Olson CM. Nutrition and health outcomes associated with food insecurity and hunger. *J Nutr* 1999 Feb;129 (2S Suppl);521S-524S.

8. Kendall A, Olson CM, Frongillo EA. Relationship of hunger and food insecurity to food availability and consumption. *J Am Diet Assoc* 1996 Oct;95(10):1019-24.

9. Rose D, Oliveira V. Nutrient intakes of individuals from food-insufficient households in the United States. *Am J Public Health* 1997 Dec;87(12):1956-1961.

10. Tarasuk VS, Beaton GH. Women's dietary intakes in the context of food security. *J Nutr* 1999;129:672-79.

11. Lawn J. *Air Stage Subsidy Monitoring Program Final Report. Volume 1: Food Price Survey*. Ottawa: Indian and Northern Affairs Canada, 1994.

12. Indian and Northern Affairs Canada, unpublished data.

13. Wein E. The high cost of a nutritionally adequate diet in four Yukon communities. *Can J Public Health* 1994 Sept - Oct;85(5):310-12.

14. Lawn J. *Food costs in Treaty 8 communities of Northern Alberta: Northern River Basins Food Consumption Study*. Prepared for Alberta Treaty 8 Health Authority, Feb 2000, unpublished.

15. Ladouceur LL, Hill F. *Results of the survey on food quality in six isolated communities in Labrador, March 2001*. Ottawa: Indian and Northern Affairs Canada, 2002.

16. Statistics Canada, 2001 Census of Canada.

17. Government of Nunavut, Department of Education, 2003.

18. National Council of Welfare. *Welfare Incomes, 2000 and 2001*. Ottawa, 2002.

19. Unpublished information, Government of Nunavut, Department of Education, 2003.

20. Statistics Canada. *Low Income Cut-Offs*. Catalogue No. 13-551-X1B. Ottawa: December 1999.

21. Kuhnlein HV, Soueida R. Use and nutrient composition of traditional Baffin Inuit foods. *J Food Comp and Analysis* 1992;5:112-126.

22. Kuhnlein HV, Kubow S, Soueida R. Lipid components of traditional Inuit foods and diets of Baffin Island. *J Food Comp and Analysis* 1991;4:227-236.

23. Nobmann E. *Nutrient value of Alaska native foods, rev October 1993*. Anchorage, Alaska: U.S. Department of Health and Human Services, Indian Health Service, Alaska Area Native Health Service, Anchorage, Alaska.

24. Institute of Medicine. *Dietary Reference Intakes: applications in dietary assessment*. Washington, D.C.: National Academy Press, 2001.

25. Nusser SM, Carriquiry AL, Dodd KW, Fuller WA. A semiparametric approach to estimating usual daily intake distributions. *J Am Stat Assoc* 1996;91:1440-1449.

26. Beltsville Human Nutrition Research Center, Agricultural Research Service. *The Continuing Survey of Food Intakes by Individuals 1994-1996 and the Diet and Health Knowledge Survey*. Beltsville, Maryland: United States Department of Agriculture, 2000.

27. Bickel G, Nord M, Price C, Hamilton W, Cook J. *Guide to measuring household food security: revised 2000*. United States Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition and Evaluation. Alexandria, Virginia: 2000.

28. Radimer KL, Olson CM, Greene JC, Campbell CC, Habicht JP. Understanding hunger and developing indicators to assess it in women and children. *J Nutr Ed* 1992;24((Suppl):36S-44S.

29. Nord M, Jemison K. Effects of cultural differences on the measurement of food insecurity and hunger. *Annual Meeting of the Rural Sociological Society, Chicago, Ill, August 4-8, 1999*. Unpublished revised version, June 4, 2001.

30. Kuhnlein HV, Soueida R, Receveur O. Dietary nutrient profiles of Canadian Baffin Island Inuit differ by food source, season, and age. *J Am Diet Assoc* 1996 Feb;96(2):155-62.

31. Beaton GH, Milner J, Corey P, McGuire V, Cousins M, Stewart E, deRamos M, Hewitt D, Grambsch PV, Kassim N, Little JA. Sources of variance in 24-hour dietary recall data: implications for nutrition study design and interpretation. *Am J Clin Nutr* 1979;32:2546-2559.

32. Tarasuk V, Beaton GH. The nature and individuality of within-subject variation in energy intake. *Am J Clin Nutr* 1991;54:464-470.

33. Tarasuk V and Beaton GH. Statistical estimation of dietary parameters: implications of patterns in within-subject variation - a case study of sampling strategies. *Am J Clin Nutr* 1992;55:22-27.

34. Nelson M, Black AE, Morris JA, Cole TJ. Between- and within-subject variation in nutrient intake from infancy to old age: estimating the number of days required to rank dietary intakes with desired precision. *Am J Clin Nutr* 1989;50:155-157.

35. Schoeller DA. Validation of habitual energy intake. *Abs The Fourth International Conference on Dietary Assessment Methods, Sept 17-20, 2000, Tucson, Arizona*. University of Arizona, Tucson: 2000.

36. Briefel RR, Sempos CT, McDowell MA, Chien S, Alaimo K. Dietary methods research in the Third National Health and Nutrition Examination Survey: underreporting of energy intake. *Am J Clin Nutr* 1997;65:1203S-1209S.

37. Lahmann P, Lissner L, Mattisson I, Gullberg B, Berglund G. Cultural differences in underreporting: ethnicity or obesity? *Abs. The Fourth International Conference on Dietary Assessment Methods, Tucson, Arizona, Sept 17-20, 2000*. University of Arizona, Tucson: 2000.

38. Johansson G, Wikman A, Ahren AM, Hallmans G, Johansson I. Underreporting of energy intake in repeated 24-hour recalls related to gender, age, weight status, day of interview, educational level, reported food intake, smoking habits and area of living. *Public Health Nutr* 2001 Aug;4(4):919-27.

39. Horner NK, Patterson RE, Neuhouser ML, Lampe JW, Beresford SA, Prentice RI. Participant characteristics associated with errors in self-reported energy intake from the Women's Health Initiative food-frequency questionnaire. *Am J Clin Nutr* 2002 Oct;76(4):766-73.

40. Shai J, Shahar D, Vardi H, Fraser DS. Underreporting of energy intake in the Israeli population. *Abs. The Fourth International Conference on Dietary Assessment Methods, Tucson, Arizona, Sept 17-20, 2000.* University of Arizona, Tucson: 2000.

41. Hebert JR, Ebbeling CB, Matthews CE. Social desirability and approval-related biases in middle-aged women's energy intake: comparing structured dietary questionnaires to energy expenditure using doubly-labelled water. *Abs. The Fourth International Conference on Dietary Assessment Methods, Tucson, Arizona, Sept 17-20, 2000.* University of Arizona, Tucson: 2000.

42. Hebert JR, Peterson KE, Hurley TG, Stoddard AM, Cohen N, Field AE, Sorensen G. The effect of social desirability trait on self-reported dietary measures among multi-ethnic female health center employees. *Ann Epidemiol* 2001 Aug;11(6):417-27.

43. Cullen KW, Baranowski T, Baranowski J, Bebert D, de Moor C. Pilot study of the validity and reliability of brief fruit juice and vegetable screeners among inner city African American boys and 17-20 year old adults. *J Am Coll Nutr* 1999;18:442-450.

44. Block G. Use of the Block questionnaire in the WIC program. In: *Framework for dietary risk assessment in the WIC program.* An interim report from the Food and Nutrition Board. Institute of Medicine, Washington, D.C: National Academy Press, 2000.

45. Lawn J, Harvey D. *Northern River Basins Food Consumption Survey Report: Nutritional Implications.* Prepared for Alberta Treaty 8 Health Authority. (Publication in progress)

46. Nord M, Andrews M, Carlson S. *Measuring food security in the United States: household food security in the United States, 2001.* Food Assistance and Nutrition Research Project Number 29, Food Assistance and Nutrition Research Program, Economic Research Service, United States Department of Agriculture, Washington: 2002.

47. Blanchet C, Dewailly E, Ayotte P, Bruneau S, Receveur O, Holub BJ. Contribution of selected traditional and market foods to the diet of Nunavik Inuit women. *Can J Diet Pract Res* 2000 Summer;61(2):50-59.

48. Statistics Canada. *Self-rated health by age group and sex, household population aged 12 and over, Canada, 2000/01.* May 23, 2002. Web site:

http://www.statcan.ca/english/freepub/82-221-XIE/00502/tables/1115.htm.

49. Office of Nutrition Policy, Health Canada. *Canadian guidelines for body weight classification in adults*. In press. Ottawa: February 3, 2003.

50. Torrance GM, Hooper MD, Reeder BA. Trends in overweight and obesity among adults in Canada (1970-1992): evidence from national surveys using measured height and weight. *International J Obesity* 2002;26:797- 804.

51. Katzmarzyk PT. The Canadian obesity epidemic, 1985-1998. *CMAJ* 2002;166(8):1039-40.

52. Tremblay MS, Katzmarzyk PT, Willms JD. Temporal trends in overweight and obesity in Canada, 1981-1996. *International J Obesity* 2002;26(4):538-543.

53. Young TK, Reading J, Elias B, O'Neil JD. Type 2 diabetes mellitus in Canada's First Nations: status of an epidemic in progress. *CMAJ* 2000;163(5):561-6.

54. Kuczmarski MF, Kuczmarski RJ, Najjar M. Effects of age on validity of self-reported height, weight, and body mass index: findings from the Third National Health and Nutrition Examination Survey, 1988-1994. *J Am Diet Assoc* 2001 Jan; 101 (1):28-34.

55. Spencer EA, Appleby PN, Davey GK, Key TJ. Validity of self-reported height and weight in 4808 EPIC-Oxford participants. *Pub Health Nutr* 2002 Aug;5(4):561-5.

56. Pirie P, Jacobs D, Jeffery R, Hannan P. Distortion in self-reported height and weight data. *J Amer Diet Assoc* 19981 Jun;78(6):601-6.

57. Villanueva EV. The validity of self-reported weigh tin US adults: a population based cross-sectional study. *BMC Pub Health* 2001;1(1):11.

58. NHLBI/NIDDK (National Heart, Lung, and Blood Institute/National Institute of Diabetes and Digestive and Kidney Diseases). *Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: the evidence report*. NIH Publication No. 98-4083. National Institutes of Health, Bethesda: 1998.

59. National Cholesterol Education Program. *Third report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III)*. NIH Publication No. 01-3670, National Institutes of Health, Bethesda: 2001.

60. World Health Organization. *Obesity: preventing and managing the global epidemic: report of a WHO consultation*. Geneva: World Health Organization, 2000.

61. Ledoux M, Lambert J, Reeder BA, Despres JP. A comparative analysis of weight to height and waist to hip circumference indices as indicators of the presence of cardiovascular disease risk factors. Canadian Heart Health Surveys Research Group. *CMAJ* 1997;157 Suppl 1:S32-8.

62. Reeder BA, Senthilselvan A, Despres JP, Angel A, Liu L, Wang H et al. The association of cardiovascular disease risk factors with abdominal obesity in Canada. Canadian Heart Health Surveys Research Group. *CMAJ* 1997;157 Suppl 1:S39-45.

63. Rexrode KM, Carey VJ, Hennekens CH, Walters EE, Colditz GA, Stampfer MJ et al. Abdominal and total adiposity and risk of coronary heart disease in women. *JAMA* 1998;280(21):1843-8.

64. Han TS, van Leer EM, Seidell JC, Lean ME. Waist circumference action levels in the identification of cardiovascular risk factors: prevalence study in a random sample. *BMJ* 1995;311(7017): 1401-5.

65. Lean ME, Han TS, Morrison CE. Waist circumference as a measure for indicating need for weight management. *BMJ* 1995;311(6998):158-61.

66. Consolazio CF, Johnson RE, Pecora LJ. *Physiological measurements of metabolic functions in man.* New York: McGraw-Hill, 1963: s414-416.

67. Armstrong DW. Metabolic and endocrine responses to cold air in women differing in aerobic capacity. *Med Sci Sport Exerc* 1998;30:880-884.

68. Health Canada. Nutrition Bureau, Nutrition Research Division, Ottawa, personal communication, November 2001.

69. Panel on Micronutrients, Panel on the Definition of Dietary Fiber, Subcommittee on Upper Reference Levels of Nutrients, Subcommittee on Interpretation and Uses of Dietary Reference Intakes, and the Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, Institute of Medicine. *Dietary Reference Intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein and amino acids.* Washington: The National Academies Press, 2002.

70. Salmerón J, Hu FB, Manson JE, Stamfer MJ, Colditz GA, Rimm EB, Willett WC. Dietary fat intake and risk of Type 2 diabetes in women. *Amer J Clin Nutr* 2001 Jun(73); 6: 1019-1026.

71. Jeqier E. Pathways to obesity. *Int J Obes Metab Disord* 2002 Sep;26 Suppl 2:S12-7.

72. Roberts CK, Barnard RJ, Liang KH, Vaziri ND. Effect of diet on adipose tissue and skeletal muscle VLDL receptor and LPL: implications for obesity and hyperlipidemia. *Atherosclerosis* 2002 Mar;161 (1):133-41.

73. Bessesen DH. The role of carbohydrates in insulin resistance. *J Nutr* 2001 Oct;131(10):2782S-2786S.

74. Cordain L, Eaton SB, Miller JB, Mann N, Hill K. The paradoxical nature of hunterer-gatherer diets: meat-based, yet non-atherogenic. *Eur J Clin Nutr* 2002 Mar;56 Suppl 1:S42-52.

75. American Dietetic Association. Health implications of dietary fiber - position of ADA. *J Am Diet Assoc* 1997;97:1157-1159.

76. Ludwig DS, Pereira MA, Kroenke CH, Hilner JE, Van Horn L, Slattery ML, Jacobs DR Jr. Dietary fiber, weight gain, and cardiovascular disease risk factors in young adults. *JAMA* 1999 (Oct 27);282 (16):1539-46.

77. Nawrot P, Jordan S, Eastwood J, Rotstein J, Hugenholtz A, Feeley M. Effects of caffeine on human health. *Food Add and Contaminants* 2003; 20:1-30.

78. Panel on Micronutrients, Subcommittees on Upper Reference Levels of Nutrients and of Interpretation and Use of Dietary Reference Intakes and the Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, Food and Nutrition Board, Institute of Medicine. *Dietary Reference Intakes for vitamin A, vitamin K, arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium.* Washington: National Academy Press, 2001.

79. Lynch SR. Interaction of iron with other nutrients. *Nutr Rev* 1997;55:102-110.

80. Standing Committee on the Scientific Evaluation of Dietary Reference Intakes and its Panel on Folate, Other B Vitamins, and Choline and Subcommittee on Upper Reference Levels of Nutrients, Food and Nutrition Board, Institute of Medicine (IOM). *Dietary Reference Intakes for thiamin, riboflavin, niacin, vitamin B6, folate, vitamin B12, pantothenic acid, biotin and choline.* Washington: National Academy Press, 2000.

81. O'Keefe CA, Bailey LB, Thomas EA, Hofler SA, Davis BA, Cerda JJ, Gregory JF 3rd. Controlled dietary folate affects folate status in non-pregnant women. *J Nutr* 1995;125:2717-2725.

82. George L, Mills JL, Johansson AL, Nord Mark A, Olander B, Granath F, Cnattingius S. Plasma folate levels and risk of spontaneous abortion, *JAMA* 2002 Oct 16;288(15):1867-73.

83. McDonald SD, Perkins SL, Jodouin CA, Walker MC. Folate levels in pregnant women who smoke: and important gene/environment interaction. *Am J Obstet Gynecol* 2002 Sep;187(3):620-5.

84. Panel on Dietary Antioxidants and Related Compounds, Subcommittees on Upper Reference Levels of Nutrients and Interpretation and Uses of Dietary Reference Intakes, and the Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, Food and Nutrition Board, Institute of Medicine. *Dietary Reference Intakes for vitamin C, vitamin E, selenium, and carotenoids.* Washington: National Academy Press, 2000.

85. Leggott PJ, Robertson PB, Rothman DL, Murray PA, Jacob RA. Effects of ascorbic acid depletion and supplementation on periodontal health. *J Periodontiol* 1986;57:480-485.

86. Levine M, Conry-Cantilena C, Wang Y, Welch RW, Washko PW, Dhariwal KR, Park JB, Lazare A, Graumlich JF, King J, Catilena LR. Vitamin C pharmokinetics in healthy volunteers: evidence for a recommended dietary allowance. *Proc Natl Acad Sci* 1996;93:3704-3709.

87. Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, Food and Nutrition Board, Institute of Medicine (IOM). *Dietary Reference Intakes for calcium, phosphorus, magnesium, vitamin D, and fluoride.* Washington: National Academy Press, 1999.

88. Sellers, EAC, Sharma A, Rodd C. Adaptation of Inuit children to a low-calcium diet. *CMAJ* 2003;168 (9):1141.

89. Anderson SA, editor. Core indicators of nutritional sate for difficult-to-sample populations: a report prepared by the Life Sciences Research Office, Federation of American Societies for Experimental Biology for the American Institute of Nutrition under Cooperative Agreement No. HPU 880004-01-0, Nutritional Status Indicators of Low-income Populations, with the Office of Disease Prevention and Health Promotion, Department of Health and Human Services. *J Nutr* 1990;120 (11S):1557-1600.

90. Agriculture and Agri-Food Canada. *Canada's action plan for food security: a response to the World Food Summit.* Pub No. 1987E, Ottawa: 1998.

91. Alaimo K, Olson CM, Frongillo EA. Low family income and food insufficiency in relation to overweight in U.S. children: is there a paradox?. *Arch Pediatr Adolesc Med* 2001 Oct;155(10):1161-7.

92. Townsend MS, Peerson J, Love B, Achterberg C, Murphy SP. Food insecurity is positively related to overweight in women. *J Nutr* 2001 Jun;131(6):1738-45.

APPENDIX A – NUTRITION QUESTIONNAIRE

ID											

INT NO		

Nutrition Questionnaire

Kugaaruk Food Mail Pilot Project

2001

Note to interviewer: Please enter starting time:_____AM /PM

Note to interviewer: Please enter time when the interview is complete and circle AM or PM: _____AM / PM

ID											

A. 24-Hour Recall

This part of the questionnaire asks about all the foods and drinks you consumed over the past 24 hours. We want to include everything, that is, both country and store foods, and not only meals, but also snacks and beverages. First we will make a list, according to the TIME of day you ate each meal or snack. Then later we will review the list to make sure that nothing is forgotten and to add the amounts of each item. This is easier than you may think at first. From this list we will be able to know if people are getting the energy and nutrients they need for good health.

Let's begin at this time yesterday. Where were you at this time yesterday? *(This helps the person to recall.)* Did you eat or drink anything at this time yesterday? When was the first time after this that you ate or drank something? What did you eat (and/or drink)?... When was the next time you had something to eat or to drink? What did you have? *[LEAVE SPACES BETWEEN FOODS AND TIMES, ESPECIALLY AFTER COFFEE AND TEA SO THAT MILK OR SUGAR CAN BE ADDED ON THE SECOND PASS.]*

(When you have covered 24 hours, then say) Let's go back over this list and add the amounts. *(Ask for details about each food. For example, you might say)* I have some measuring cups, spoons, bowls and food models to help estimate the amounts. *(Set out the household measures and the food models.)*

First, you mentioned *(name of food or drink). [ON THE SECOND PASS, ASK FOR MORE DETAIL ABOUT THE DESCRIPTION OF THE FOOD, E.G., What type? Did you add anything to it (e.g. to the coffee, to the bannock, to the cereal, etc.)? What brand?]* Using these measuring cups or food models, how much did you have at *(time)* yesterday? *(Continue until the full 24 hours are covered. Review list to ensure that a full 24 hours are covered, and for a complete description of each food and amount.) [DON\T FORGET TO ASK IF THE FOOD WAS CANNED, MADE FROM A MIX OR FROZEN AND TO NOTE "C", "M" OR "F" IN THE SECOND COLUMN.]*

(If homemade food mixtures are reported, ask about the recipe and record on the recipe form at the end.) USING A SMALL POST-IT, LABEL EACH RECIPE WITH A NUMBER AND AFTER YOU FEEL YOU HAVE A COMPLETE DESCRIPTION OF EVERYTHING CONSUMED DURING THAT 24 HOURS, ASK THE PARTICIPANT TO PROVIDE THE INGREDIENTS AND AMOUNTS (USING THE MODELS OR HOUSEHOLD MEASURES ***AND*** *THE NUMBER OF PORTIONS (USING A HOUSEHOLD MEASURE) THE RECIPE MAKES. FOR TOTAL NUMBER OF SERVINGS, USE NUMBER OF PORTIONS AND MODELS (E.G. MAKES 6 MO-XL).*

We also need to know if you take any nutrition supplements and what kind. *[COMPLETE LARGE 24-HOUR RECALL FORM.]*

ID

B. Food Frequency Questionnaire

Now I would like to ask you about the past month. These questions will only ask about how often you ate or drank certain foods or beverages. This information is important because it provides a better picture of what you usually eat over a longer period.

I will give you a series of cards with a list of foods. Together we will read each list and I will ask you to estimate how often you have consumed these foods or beverages *over the past month*.

101 Let's begin with list A. Starting with caribou, did you eat caribou during the past month? *[CHECK YES OR NO. IF NO, GO TO NEXT FOOD.]*

102 If YES, how often did you eat caribou over the past month? *[FOR EACH FOOD, ENTER HOW OFTEN THE FOOD IS EATEN (TIMES PER DAY OR WEEK OR MONTH) IN ONE OF THREE COLUMNS.]*

101	Have you eaten any of the foods on this list in the past month?	YES √	NO √	102. IF YES, how often? (Number of times)		
				Day	Week	Month
1	Caribou					
2	Seal					
3	Walrus					
4	Muskox					
5	Liver from caribou, seal or walrus					
6	Polar bear					
7	Muktuk					
8	Seal fat or oil					
9	Blubber					
10	Rabbit					
11	Ptarmigan					
12	Geese					
13	Ducks					

ID											

101	Have you eaten any of these foods in the past month?	YES √	NO √	102. IF YES, how often? (Number of times)		
				Day	Week	Month
14	Arctic char					
15	Trout					
16	Grayling					
17	Cod					
18	Whitefish					
Now let's look at List B. *[SHOW LIST B]*						
19	Baked bannock					
20	Fried bannock					
21	White bread					
22	Whole wheat bread					
23	Eggs					
24	Packaged sandwiches or hamburgers					
25	Canned stew					
26	Processed cheese (e.g., Velveeta, Kraft slices)					
27	Block or grated cheese					
28	Cheez Whiz					
29	Yogurt					
30	Frozen fried breaded chicken					
31	Frozen pizza					
32	Pizza made from mix					
33	Frozen Chinese food					
34	Other frozen meals					
35	Kraft Dinner or other macaroni and cheese dinner					
Can you tell me if you have eaten any of the foods on this list in the past month? And if so, how often? *[SHOW LIST C]*						
36	Fresh potatoes					
37	Frozen French Fries					
38	Instant mashed potatoes (Carnation/Shirriff)					

ID

101	Have you eaten any of these foods in the past month?	YES √	NO √	102. IF YES, how often? (Number of times)		
				Day	Week	Month
39	Fresh carrots					
40	Frozen carrots					
41	Canned corn					
42	Other canned vegetables					
43	Canned fruit					
44	Oranges					
45	Apples					
	Now I would like to show you a list of vegetables. From this list can you tell me which 5 vegetables (fresh or frozen) you have eaten most often in the past month? *[DO NOT READ THE LIST. SHOW CARD D. CHECK YES FOR THE 5 VEGETABLES THE RESPONDENT SELECTS AND ENTER HOW OFTEN EACH VEGETABLE WAS EATEN IN THE PAST MONTH]*					
46	Green or yellow beans					
47	Broccoli					
48	Cabbage					
49	Cauliflower					
50	Corn					
51	Lettuce					
52	Mixed vegetables, frozen					
53	Mushrooms					
54	Onions					
55	Parsnips					
56	Peas, frozen					
57	Peppers					
58	Salad mix, fresh					
59	Spinach					
60	Squash					
61	Sweet potatoes					

ID

[CHECK YES FOR THE 5 VEGETABLES THE RESPONDENT SELECTS AND ENTER HOW OFTEN EACH VEGETABLE WAS EATEN IN THE PAST MONTH]		YES √	NO √	102. IF YES, how often? (Number of Times)		
				Day	Week	Month
62	Tomatoes					
63	Turnips					
64	Other fresh or frozen vegetables (specify)					
Now I would like to show you a list of fruit. From this list can you tell me which 5 fruit (fresh or frozen) you have eaten most often in the past month? *[DO NOT READ THE LIST. SHOW CARD E. CHECK YES FOR THE 5 FRUITS THE RESPONDENT SELECTS AND ENTER HOW OFTEN EACH FRUIT WAS EATEN IN THE PAST MONTH.]*						
65	Bananas					
66	Blueberries					
67	Cantaloupe					
68	Cherries					
69	Grapefruit					
70	Grapes					
71	Kiwi					
72	Peaches					
73	Pears					
74	Pineapple					
75	Plums					
76	Strawberries					
77	Watermelon					
78	Other fresh or frozen fruit					

ID

Finally, I would like to ask you about drinks and snack foods. *[SHOW LIST F]*		YES √	NO √	102. IF YES, how often? (Number of times)		
101	**Have you eaten any of these foods in the past month?**			**Day**	**Week**	**Month**
79	Tang or other fruit drink crystals with vitamin C					
80	Kool-Aid or other fruit drink crystals - no vitamin C					
81	Sunny Delight					
82	Fresh fruit juice (e.g., Tropicana)					
83	Frozen fruit drinks (punch, lemonade)					
84	Frozen pure fruit juice (e.g., McCain's orange juice, apple juice)					
85	Fresh or boxed milk					
86	Chocolate milk					
87	Coffee					
88	Tea					
89	Pop					
90	Chocolate bars					
91	Potato chips					

ID											

The next few questions are about preparing food in the past month.

103	First, did you usually put anything on bread or bannock? *[CIRCLE YES OR NO]*	YES	NO
IF YES, can you tell me which of these you usually use? *[CHECK ONE]* ✓			
a	Butter		
b	Hard margarine		
c	Soft margarine		
d	Lard		
e	Seal fat		

104	In the past month what kind of milk did you usually use on your cereal? *[CHECK ONE]* ✓
a	Fresh or boxed milk
b	Canned milk
c	Powdered milk
d	Didn't use milk
e	Didn't eat cereal

105	When you prepared mashed potatoes, what kind of milk did you usually add?	*[CHECK ONE]* ✓
a	Fresh or boxed milk	
b	Canned milk	
c	Powdered milk	
d	Didn't use milk	
e	Didn't eat mashed potatoes	

ID

106	What do you usually put in your tea and coffee?	*[CHECK ONE]* ✓
a	Fresh or boxed milk	
b	Canned milk	
c	Powdered milk	
d	Coffeemate	
e	Don't use milk	
f	Sugar	

107 In recipes, what kind of milk do you usually use? *[CHECK ONE]*

a. In bannock		✓	**b. In macaroni and cheese dinner**		✓
i	Fresh whole milk		i	Fresh whole milk	
ii	Fresh or boxed 2% milk		ii	Fresh or boxed 2% milk	
iii	Powdered milk		iii	Powdered milk	
iv	Evaporated milk, mixed with water		iv	Evaporated milk, mixed with water	
v	Evaporated milk, no water		v	Evaporated milk, no water	
vi	Don't use milk		vi	Don't use milk	

108 What do you usually use to make bannock? *[CIRCLE ONE RESPONSE]*

a Lard
b Margarine
c Butter
d Seal fat
e Oil
f Don't make bannock

109 If you make bannock, what proportion of flour to (name of fat given above) do you use to make bannock?

_____cups flour _____pounds/tablespoons fat

ID

C. Health and Lifestyle

This section asks a few questions about your health and lifestyle.

200 Compared to other people your age, would you say your health is excellent, very good, good, fair or poor? *[CIRCLE RESPONSE]*

a excellent
b very good
c good
d fair
e poor

201 Do you have any medical condition that affects what you eat? *[CIRCLE RESPONSE]*

1 YES 2 NO

If YES, please explain_____

202 Are you pregnant at the present time?

a YES
b NO →
c Don't know →
d Refuse to answer →

Go to Q204

203 How long have you been pregnant? _____ months _____ weeks

204 Are you presently breast-feeding? 1 YES 2 NO

ID

Next, I would like to ask you some questions about smoking.

205 Have you ever been a regular smoker of cigarettes? *[CIRCLE RESPONSE]*

1 YES

2 NO → **GO TO Q210**

206 How old were you when you started smoking? *[ENTER AGE]* ____ years old

207 At the present time, how often do you smoke cigarettes? *[CIRCLE RESPONSE]*

a every day

b occasionally

c not at all → **GO TO Q209**

208 On the average, how many cigarettes do you smoke a day? *[ENTER NUMBER]*

_____ cigarettes → **GO TO Q210**

209 How long ago did you stop smoking cigarettes?

a Less than 1 year ago *[ENTER NUMBER]* _____ months

b More than 1 year ago *[ENTER NUMBER]* _____ years

ID

The next few questions are about your current physical exercise.

210 Which of the following statements best describes your activities for most days when you are in the community? *[SHOW CARD AND READ LIST. CIRCLE ONE RESPONSE.]*

a I am usually sitting and do not walk around very much.

b I stand or walk around quite a lot, but I do not have to carry or lift things very often.

c I usually lift or carry light loads or I have to climb stairs or hills often.

d I do heavy work or carry heavy loads.

211 In the past year, how much time would you say that you spent on the land (fishing, trapping, hunting)? *[DO NOT READ LIST. CIRCLE ONE RESPONSE]*

a none
b less than 1 month
c 1 month
d 2 to 3 months
e 4 to 5 months
f 6 months
g more than 6 months

D. Demographic Information

To complete the study we need some personal information. Like the entire study, this information is totally confidential.

300 First, what ethnic group do you belong to? *[CIRCLE RESPONSE]*

a Inuit
b Other Aboriginal
c Non-Aboriginal

301 What is your date of birth? _____ 302 Age ___YRS
MONTH DAY YEAR

ID

In order to determine if women in this community are getting the food they need for good health, we need to collect information on height, weight and waist/hip measurements. The nursing staff at the Health Centre have agreed to record this information in order to make sure that the information is as accurate as possible.

303 Would you be willing to go to the Health Centre on _____(date or day) to get your height, weight and waist/hip measurements done? *[CIRCLE RESPONSE]*

1 YES 2 NO

304 IF NO, can you tell me your height and weight?

HEIGHT _____cm OR _____inches

WEIGHT _____kg OR _____pounds

305 Do you usually buy the food for your household?

1 YES → **Go to Household Questionnaire**

2 NO **THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION. CAN I SPEAK TO THE PERSON WHO USUALLY BUYS THE FOOD?**

APPENDIX B – HOUSEHOLD QUESTIONNAIRE

House Number							

Interviewer Number		

Household Questionnaire

Kugaaruk Food Mail Pilot Project

2001

Note to interviewer: Please enter date and starting time DAY__ MONTH__ YEAR:_____AM /PM_____

Note to interviewer: Please enter time when the interview is complete and circle AM or PM): _____AM / PM

House Number							

[PLEASE NOTE THAT ONLY THE PERSON WHO USUALLY BUYS MOST OF THE FOOD SHOULD COMPLETE THIS QUESTIONNAIRE]

A. HOUSEHOLD COMPOSITION, ACCESS TO COUNTRY FOOD AND COMMUNITY CONCERNS

Let's begin with a few questions about your household.

400 Can you tell me how many Inuit and non-Inuit adults are living in this household?

Age Group		1. Can you tell me how many are Inuit?	2. Can you tell me how many are non-Inuit?
a	Between the ages of 18 and 44?		
b	Between the ages of 45 and 59?		
c	Between 60 and 64?		
d	And age 65 and over?		

401 Can you tell me how many persons **AGED 17 OR UNDER** live in this house and their ages? *[INDICATE THE NUMBER OF PEOPLE IN EACH AGE GROUP IN THE SECOND ROW OF THE APPROPRIATE COLUMN.]*

Age	< 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
No.																		

402 Is your household able to get country food most of the time? *[CIRCLE RESPONSE]*

YES

NO

Don't know

House Number							

403 **IF YOU CANNOT GET COUNTRY FOOD**, can you tell me why? *[DO NOT READ REASONS. WRITE THE NUMBER OF THE FIRST 3 REASONS IN THE SPACES BELOW. IF NECESSARY, PROMPT BY ASKING "WERE THERE ANY OTHER REASONS?"]*

1. No transportation
2. No hunter or fisherman in the household
3. Hunter or fisherman in family is sick/ injured
4. Hunter or fisherman is working, so doesn't have time to hunt
5. Gas too expensive
6. Repairs too expensive
7. Country food not available
8. Food is not shared in the community
9. Have nowhere to store country food
10. No hunting or fishing equipment
11. Other, explain _____ _____

Reason 1. _____ Reason 2. _____ Reason 3. _____

404 First, I would like to read a list of events or problems that may affect you and your community. For each one, please tell me if you are not concerned, a little concerned, or extremely concerned about this problem at the present time. *[READ EACH PROBLEM AND CIRCLE 1, 2 OR 3 FOR EACH PROBLEM]*

	Not concerned	A little concerned	Extremely concerned
a. Alcohol or drug abuse	1	2	3
b. Not having enough money for food	1	2	3
c. Not being able to get country food	1	2	3
d. The safety of country food	1	2	3
e. Family violence	1	2	3
f. Not enough jobs in the community	1	2	3

House Number							

B. FOOD PURCHASING

Now I would like to talk about where you usually buy your food.

500 Where do you usually buy most of your food? From the Coop, from Yellowknife by Food Mail, or from the south by air cargo?

		1 Coop	2 Food Mail	3 Air Cargo	4 Other (specify)
a.	Store meat?	☐	☐	☐	☐
b.	Fresh fruit?	☐	☐	☐	☐
c.	Fresh vegetables?	☐	☐	☐	☐
d.	Frozen food?	☐	☐	☐	☐
e.	Fresh milk?	☐	☐	☐	☐

501 Do you ever buy any country food from the coop? 1 YES 2 NO

502 Did you get a barge order this year? 1 YES 2 NO

House Number							

Now I would like to talk about the quality of the food SOLD in Kugaaruk.

503 How would you describe the quality of the following kinds of food sold in your community IN THE PAST 4 WEEKS? Would you say it was poor, fair, good or excellent? *[DO NOT READ DON'T KNOW OR NOT AVAILABLE. CHECK, IF THIS IS THE RESPONSE].*

	1 Poor	2 Fair	3 Good	4 Excellent	DK	NA
a. Apples	☐	☐	☐	☐	☐	☐
b. Oranges	☐	☐	☐	☐	☐	☐
c. Bananas, grapes	☐	☐	☐	☐	☐	☐
d. Potatoes	☐	☐	☐	☐	☐	☐
e. Carrots, onions, turnips, cabbage	☐	☐	☐	☐	☐	☐
f. Lettuce, tomatoes peppers	☐	☐	☐	☐	☐	☐
g. Broccoli, cauliflower	☐	☐	☐	☐	☐	☐
h. Bread	☐	☐	☐	☐	☐	☐
i. Eggs	☐	☐	☐	☐	☐	☐
j. Fresh milk	☐	☐	☐	☐	☐	☐
k. Frozen store meat	☐	☐	☐	☐	☐	☐
l. Frozen vegetables	☐	☐	☐	☐	☐	☐
m. Other frozen food	☐	☐	☐	☐	☐	☐

504 Is there enough variety of fresh fruit and vegetables available in Kugaaruk?... Always, most of the time, sometimes or never? *[DO NOT READ DON'T KNOW BUT CHECK IF THIS IS THE ANSWER]*

☐ Always ☐ Most of the time ☐ Sometimes ☐ Never ☐Don't know

House Number							

505 Compared to this time last year, have you noticed that the price of fresh fruits and vegetables is higher, lower or the same? *[DO NOT READ DON'T KNOW. CHECK RESPONSE]*

☐ Higher ☐ Lower ☐ Same, no change ☐ Don't know

506 Here is a list of reasons people sometimes give for not buying fresh fruit and vegetables. What is keeping you from buying more of these foods? *[SHOW CARD, READ LIST, CHECK ALL THAT APPLY]*

- ☐ They cost too much
- ☐ Poor quality
- ☐ Not enough variety
- ☐ Often not available
- ☐ Don't know how to use them
- ☐ They don't keep well at home
- ☐ Prefer canned products
- ☐ Another reason:_____
- ☐ Don't like the taste
- ☐ Too much trouble to cook them
- ☐ Don't need these foods to be healthy
- ☐ Already eat a lot of these foods
- ☐ Can't digest these foods
- ☐ Can't afford them
- ☐ Prefer frozen products

House Number							

Now I would like to ask you about WHICH foods you have purchased IN THE PAST 4 WEEKS.

507 First, can you tell me which of the following foods have you bought IN THE PAST 4 WEEKS? *[SHOW PICTURES OR CARD, READ LIST AND CHECK ALL THAT APPLY]*

Fresh fruit:	☐ Apples	☐ Oranges	☐ Bananas	☐ Grapes	☐ Berries
	☐ Kiwi	☐ Plums	☐ Melons	☐ Grapefruit	☐ Watermelon
	☐ Other (specify)				
Fresh vegetables:	☐ Lettuce	☐ Broccoli	☐ Tomatoes	☐ Cauliflower	☐ Turnips
	☐ Cabbage	☐ Onions	☐ Peppers	☐ Carrots	☐ Potatoes
	☐ Cucumber	☐ Celery	☐ Squash	☐ Spinach	☐ Mushrooms
Milk products:	☐ Fresh milk	☐ Boxed milk	☐ Cheese	☐ Yogurt	
	☐ Ice cream				
	☐ Powdered milk			☐ Evaporated milk	
Frozen food:	☐ Store meat	☐ Frozen pizza		☐ Frozen meals	
	☐ French fries	☐ Frozen mixed vegetables			
	☐ Other frozen vegetables				
	☐ Frozen fruit drinks (e.g., lemonade, fruit punch)				
	☐ Frozen pure fruit juice (e.g., McCain's orange juice or apple juice)				
Country Food	☐ Caribou	☐ Muskox		☐ Seal	
	☐ Arctic Char	☐ Muktuk		☐_____	

House Number							

C. FOOD SECURITY

This section asks questions about being able to afford food for your household. Some of the questions are very personal and may be difficult for you to answer. However, this information will help community and health leaders to have a better understanding of problems facing families in this community and to design better programs to help. Like the rest of the questionnaire, this information is strictly confidential and no names will be released to the community or government. You are free to refuse to answer any question, but your answers may be able to help others in Kugaaruk and other Inuit communities.

I would like to read a series of statements that describe the experience of some families. I will also give you a card, so that you can read the statement and decide if it describes your experience.

House Number							

The first statements are about the food eaten in your household in the last 12 months and ***whether you were able to afford the food you need.*** For each of these statements, please tell me whether this happened often, sometimes or never for your household in the last 12 months. *[GIVE FOOD SECURITY CARD TO RESPONDENT SO THAT THEY CAN READ EACH STATEMENT.]*

600 Some families might say, ***"We worried whether our food would run out before we got money to buy more."*** In the last 12 months, did that happen often, sometimes, or never for your household?

a	Often	[ ]
b	Sometimes	[ ]
c	Never	[ ]
d	Don't know or refused	[ ]

601 Some families might say, ***"The food that we bought just didn't last, and we didn't have money to get more."*** In the last 12 months did that happen often, sometimes, or never for your household?

a	Often	[ ]
b	Sometimes	[ ]
c	Never	[ ]
d	Don't know or refused	[ ]

602 Some families might say, ***"We couldn't afford to eat healthy meals."*** In the last 12 months did this happen often, sometimes, or never for your household?

a	Often	[ ]
b	Sometimes	[ ]
c	Never	[ ]
d	Don't know or refused	[ ]

[IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK Q603 AND Q604; OTHERWISE SKIP TO 1ST LEVEL SCREEN]

603 Some families might say, ***"We could only feed our children less expensive foods because we were running out of money to buy food."*** In the last 12 months did this happen often, sometimes, or never for your household?

a	Often	[ ]
b	Sometimes	[ ]
c	Never	[ ]
d	Don't know or refused	[ ]

604 Some families might say, ***"We couldn't feed our children a healthy meal, because we couldn't afford that."*** In the last 12 months, did that happen often, sometimes, or never for your household?

a	Often	[ ]
b	Sometimes	[ ]
c	Never	[ ]
d	Don't know or refused	[ ]

[1ST LEVEL SCREEN (SCREENER FOR STAGE 2): IF THE RESPONDENT ANSWERS "OFTEN OR SOMETIMES" TO ANY ONE OF QUESTIONS 600 TO 604, THEN CONTINUE TO STAGE 2, OTHERWISE SKIP TO Q620]

House Number							

STAGE 2: *[IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK Q 605; IF NOT, SKIP TO Q606]*

605 *Some families might say,* ***"The children were not eating enough because we just couldn't afford enough food."*** In the last 12 months, did this happen often, sometimes, or never for your household?

a	Often	[ ]
b	Sometimes	[ ]
c	Never	[ ]
d	Don't know or refused	[ ]

606 Since October last year, did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?

a	YES	[ ]
b	NO	[ ] → **Go to Q608**
c	Don't know	[ ] → **Go to Q608**

607 **[IF YES ABOVE, ASK]** How often did this happen...almost every month, some months but not every month, or in only 1 or 2 months?

a	Almost every month	[ ]
b	Some months but not every month	[ ]
c	Only 1 or 2 months	[ ]
d	Don't know	[ ]

608 In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?

a	YES	[ ]
b	NO	[ ]
c	Don't know	[ ]

609 In the last 12 months, were you ever hungry but didn't eat because you couldn't afford enough food?

a	YES	[ ]
b	NO	[ ]
c	Don't know	[ ]

610 In the last 12 months, did you lose weight because you didn't have enough money for food?

a	YES	[ ]
b	NO	[ ]
c	Don't know	[ ]

2ND LEVEL SCREEN (SCREENER FOR STAGE 3): IF RESPONDENT ANSWERED YES TO ANY OF ABOVE QUESTIONS, THEN CONTINUE TO STAGE 3; OTHERWISE GO TO Q620]

House Number							

STAGE 3:

611 In the last 12 months, did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food?

a	YES	[ ]	
b	NO	[ ]	→ Skip Q612
c	Don't know	[ ]	

612 **[IF YES ABOVE, ASK]** How often did this happen ...almost every month, some months but not every month, or only in 1 or 2 months?

a	Almost every month	[ ]
b	Some months but not every month	[ ]
c	Only 1 or 2 months	[ ]
d	Don't know	[ ]

[NOTE: IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK Q613 TO Q617; OTHERWISE SKIP TO Q618]

The next questions are about persons living in the household who are *under 18 years of age*.

613 In the last 12 months (since October of last year), did you ever cut the size of their meals because there wasn't enough money for food?

a	YES	[ ]
b	NO	[ ]
c	Don't know	[ ]

614 In the last 12 months, did any of the children ever skip meals because there wasn't enough money for food?

a	YES	[ ]	
b	NO	[ ]	→ Go to Q616
c	Don't know	[ ]	

615 **[IF YES ABOVE, ASK]** How often did this happen...almost every month, some months but not every month, or in only 1 or 2 months?

a	Almost every month	[ ]
b	Some months but not every month	[ ]
c	In only 1 or 2 months	[ ]
d	Don't know	[ ]

House Number							

616 In the last 12 months, were the children ever hungry but you just couldn't afford more food?

a YES [ ]
b NO [ ]
c Don't know [ ]

617 In the last 12 months, did your children ever not eat for a whole day because there wasn't enough money for food?

a YES [ ]
b NO [ ]
c Don't know [ ]

[ASK Q618 IF RESPONDENT ANSWERED YES TO ANY OF QUESTIONS 605 to 617. OTHERWISE GO TO Q620]

618 I would like to ask you about why your household was unable to afford enough food. Can you tell me the main reason? *[DO NOT READ REASONS. WRITE NUMBER OF FIRST 3 REASONS IN THE SPACES BELOW. IF NECESSARY, PROMPT BY ASKING, "WERE THERE ANY OTHER REASONS?"]*

a. Not working
b. Waiting for EI (Employment insurance) or social assistance
c. Not enough income
d. Spent money on medicine
e. Gave money away
f. Gave food away to others in the community
g. Had to buy hunting, fishing or trapping equipment, supplies or gas
h. Had to pay bills (like hydro, children's clothing, school supplies)
i. Spent money gambling
j. Food costs too much
k. Don't know or refuse
l. Other, explain_____

Reason 1. _____ Reason 2. _____Reason 3. _____

House Number							

[ASK Q619 IF RESPONDENT ANSWERED YES TO ANY OF QUESTIONS 605 to 617. OTHERWISE GO TO Q620]

619 When your household was unable to afford enough food, what did you do? *[DO NOT READ CATEGORIES. WRITE NUMBER OF FIRST THREE ACTIONS IN SPACES BELOW.]*

a. Ask for more social assistance (welfare/income support)

b. Ask store manager for more credit

c. Borrow food or money for food from friends or family

d. Go hunting or fishing

e. Ask help from CHR, nurse or doctor

f. Do without

g. Make an item to sell

h. Other, explain_____

Action 1. _____ Action 2. _____ Action 3. _____

[IF CHILDREN UNDER 5 IN THE HOUSEHOLD, ASK Q620, OTHERWISE GO TO Q621]

620 During the past month, did any of the children in this household receive breakfast, lunch or snacks at day care, a pre-school program or kindergarten? *[CIRCLE RESPONSE]*

a YES
b NO
c Don't know

[IF CHILDREN BETWEEN 6 AND 17 IN THE HOUSEHOLD, ASK Q621, OTHERWISE GO TO SECTION D]

621 During the past month, did any of the children in this household receive breakfast, lunch or snacks at school? *[CIRCLE RESPONSE]*

a YES
b NO
c Don't know

House Number							

Finally, to complete the questionnaire, we need to ask a few questions about household income and expenses.

D. EMPLOYMENT, INCOME AND EXPENSES

700 Has anyone in your household received assistance from the Hunter Support Program? *[CIRCLE RESPONSE]*

1 YES 2 NO 3 Don't know

701 Can you tell me how many members of your household presently:

a) Earn money from selling furs or sealskins? _____

b) Earn money from selling crafts (e.g., carvings, sewing, jewelry, etc.) _____

c) Have a job or business? _____

d) Receive a pension? _____

702 In the past month, did anyone in your household receive money from Employment Insurance (EI or UI)? *[CIRCLE RESPONSE]*

1. YES 2. NO 3. Don't know

703 In the past month, did anyone in your household receive social assistance (welfare/income support)? *[CIRCLE RESPONSE]*

1. YES ➡ **GO to Q705**

2. NO

3. Don't know

House Number							

704 Can you tell me APPROXIMATELY the **total amount of money received *in the past 4 weeks*** by **ALL** household members from all sources (e.g. take-home pay from a job, money from selling furs, sealskins, carvings or crafts, pensions, net income from running a business and Employment Insurance)? *[SHOW CARD TO PARTICIPANT TO REMIND HIM\HER OF DIFFERENT SOURCES OF INCOME AND ASK IF HE\SHE CAN TELL YOU ABOUT HOW MUCH INCOME WAS RECEIVED FOR PAST 4 WEEKS. CIRCLE THE CATEGORY WHICH BEST DESCRIBES THIS AMOUNT. DO NOT INCLUDE CHILD TAX CREDIT.]*

a. No income
b. $1500 or less
c. $1501 to $2000
d. $2001 to $3000
e. $3001 to $4000
f. $4001 to $5000
g. $5001 to $6000
h. Over $6000
i. Don't know
j. Refuse to answer

705 Was your income last month, the same as other months? *[CIRCLE RESPONSE]*

a YES
b NO, more than usual
c NO, less than usual
d Don't know

706 Can you tell me approximately how much your household usually spends ***in an average week*** on food (including food purchased from grocery stores and the hotel)? $_____

707 Last month approximately how much did you pay for rent, mortgage, electricity, heating fuel, gas, water and sewage, garbage, skidoo parts and oil, bullets, naphtha and material?
$_____

The Survey is now complete.

Thank you for your cooperation

Int. No.

24-Hour Diet Recall

DATE _____/_____/_____
M D Y

STARTING TIME_____AM/PM

I would like to begin the interview by asking what you ate or drank over the past 24 hours. Let's begin with yesterday at this time. *[ENTER C, M, OR F IN THE "C/M/F" COLUMN IF THE FOOD ITEM WAS CANNED, FROM A MIX OR FROZEN. ENTER BRAND NAME IN DESCRIPTION COLUMN WHEN FOOD IS A PREPARED PRODUCT. REVIEW LIST TWICE TO GET FULL DESCRIPTION AND AMOUNTS AND TO PROMPT MEMORY. ENTER RECIPES AND NUTRITION SUPPLEMENTS AND TIME FINISHED ON BACK OF PAGE. REMEMBER TO LEAVE SPACES BETWEEN MEALS SO THAT EXTRAS CAN BE ADDED LATER.]*

TIME	AM/ PM	C/M/ F	DESCRIPTION OF FOOD ITEM	# OF PORTIONS	DESCRIPTION OF PORTIONS	
					Model or Measure	Thickness (cm)

List of Nutrition Supplements

Did you take any vitamin, mineral or other nutrition supplements yesterday? *[CIRCLE RESPONSE]* **YES/NO**

If so, may I please see the label? *[RECORD THE BRAND NAME AND THE DRUG IDENTIFICATION NUMBER (DIN).]* **What is the usual amount taken each time? How many of these did you take yesterday? How often do you usually take this (times per day/week/month)?** *[INCLUDE: VITAMIN/MINERAL SUPPLEMENTS (E.G., CALCIUM, IRON, MATERNA); TONICS; ROLAIDS; TUMS; HERBAL PREPARATIONS]*

Nutrition Supplement DESCRIPTION	DIN # *[CHECK LABEL]*	Quantity prescribed or usual amount taken each time (e.g., 150 mg, 1 tsp) *[CHECK LABEL]*	Amount taken in last 24 hrs	How often do you usually take this? *[ENTER TIMES PER DAY, WEEK OR MONTH]*		
				Day	Week	Month

RECIPE #1

Name of recipe:_____ **Total number of servings**____

Description of ingredients and cooking method	Quantity

How was it cooked? Circle one of the following: (boil, bake, roast, stew, fry, microwave). For how long?_____min _____hours

NOTE: TIME FINISHED:_____AM / PM

RECIPE #2

Name of recipe:_____ **Total number of servings**_____

Description of ingredients and cooking method	Quantity

How was it cooked? Circle one of the following: (boil, bake, roast, stew, fry, microwave). For how long?_____min _____hours